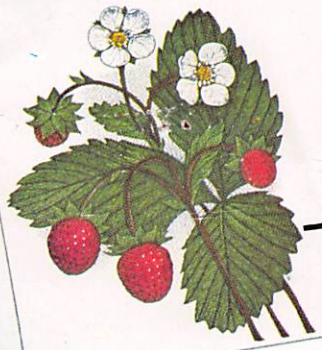
Flora & Fauna OF THE WORLD

SWEDEN • FIRST DAY COVER



STRAWBERRY • Fragaria vesca

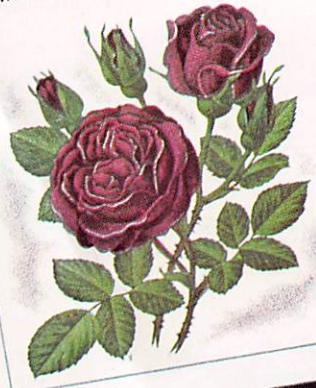
Flora & Fauna OF THE WORLD

U.S.S.R. • FIRST DAY COVER

POLAR BEAR • Thalarctos maritimus

Flora & Fauna OF THE WORLD

SWITZERLAND • FIRST DAY COVER



ROSE • Rose a Parfum de l'Hay

Test read the ultimate riding mower.

Even at Toro, we've never engineered a precision mowing instrument quite like this. For...

The Cut.

Each blade of grass has four chances to be sliced. For a cleaner cut.

FOUR CHANCES TO CUT PER PASS.

Cutting blade tips lift and fling clippings to the optional grass catcher.

Cutting speed won't slow, because blade drive's independent of the five forward speeds you match to mowing conditions.

The cutting deck floats. Front to back. Side to side. Anticipates your lawn's ups and downs. So there's less chance of scalping.

UNIQUE, FULL-FLOATING DECK.

The cut is smooth, even. At any height from 1.6 to 4 inches.

The Comfort.

Floor's flat. No hump to bang an ankle.

Seat's deep cushioned.

Controls are close at hand.

The engine is counterbalanced to cut down vibration. And it's hooded to help hold down noise.

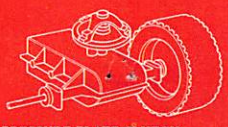
The clutch is like a car's. For smooth starts.

Steering? High helix through inclined spindles. For precise handling, straight tracking with no kickbacks from pivoted front axle moves up, down. Absorbs bumps, so you don't.

To unload, stay in your seat, pull one lever and drop 5½ bushels of clippings. Or choose the catcher that puts 5½ bushels into two disposable plastic bags for you.

The Life.

We engineered durability into this mower. And low maintenance. From the lifetime-lubricated transmission to the unique Toro two-clutch system.



PRESSURE-PLATE CLUTCH LENGTHENS BELT LIFE.

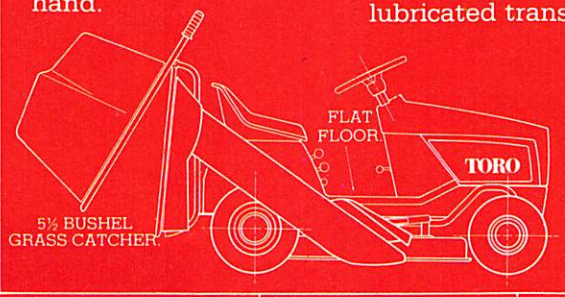
One clutch for the transmission. One for the blade. Both extend belt life.

What's significant, too, with two clutches, there are no troublesome idler pulleys to adjust.

A one-year limited warranty backs this mower just like our two medium-capacity rear-engine riders.

Your test ride's next. On any of five front-engine models.

Compare them to any other riding mower. See if we haven't engineered the ultimate.



TORO®

Haven't you done without a Toro long enough?™

The way to develop energy resources is to pool human resources.

As a company that produces many forms of energy, Conoco has many different human resources, too.

And because our people—44,000 in all—talk to each other and work with each other, they learn from each other.

For example, borrowing seismic techniques used to hunt for oil, our people have helped coal miners avoid the dangers of drilling into old, uncharted mines that are flooded with water.

And one bit of learning has come full circle: First, our engineers adapted oil production techniques to drill horizontally into coal seams before mining, to remove potentially hazardous methane gas. So more coal can be produced.

Now we've adapted this horizontal drilling system to get at petroleum deposits that were previously too difficult to tap. So more oil can be produced.

When resourceful people work together, the result is more energy for everybody.

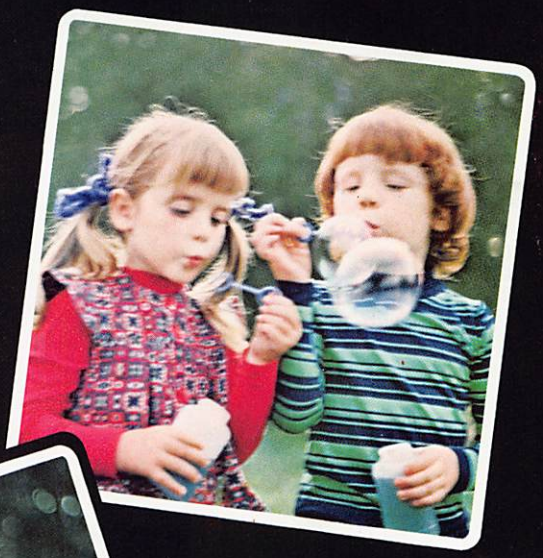
conoco

Doing more with energy.

To learn more about what we're doing with energy, write Dept. H, Continental Oil Company, Stamford, Conn. 06904.

PENTAX sets you free

so children can be seen and not blurred.



A lot of amateurs are pocketing their pocket cameras and taking a brand new look at things. Things like giggles . . . freckles . . . and those little twinkles the fixed lens snapshot camera can't capture fully.

Now it's possible to shoot for more, with the ME from Pentax. The ME was created with the amateur in mind — but it delivers professional results. It's as easy as 1-2-3. Just set, focus and shoot. For photographs instead of snapshots. For 35 mm memories with almost all the ease of snapshots — but none of the fixed lens limitations.

Years from now, you'll run across some ME photographs in a dusty album. You'll count those freckles one by one. And remember. *Really* remember . . .

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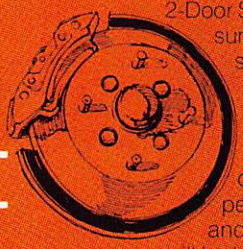
For more information write Dept. ME, PENTAX CORPORATION, P.O. Box 2677, Littleton, Colorado 80161

THE BASIC BARGAIN

The 1978 Toyota Corolla 2-Door Sedan. Our super saver. This Corolla is the lowest-priced, highest-mileage Toyota made. And, it's got famous Toyota quality.

Basic price savings. The Corolla 2-Door Sedan's design emphasizes function, not frills. That's how we give you such a quality car at such a bargain price—just $3188. Manufacturer's suggested retail price does not include tax, license, transportation, Calif. emissions or optional equipment. Like all Corollas, the 2-Door Sedan comes standard with MacPherson strut front suspension, for surer handling. Power assisted front disc brakes, for fade-resistant stopping. And an ignition system that's now fully transistorized, for more reliable starting and simplified maintenance.

$3,188



Basic gas savings. In 1978 EPA tests, the Corolla equipped with a 1.2 liter engine was rated at 46 miles per gallon on the highway, 34 city! These ratings are estimates. Your actual mileage will vary depending on your driving habits and your car's condition and equipment. California ratings will be lower.

MPG 46 HWY 34 CITY

The basic car is for keeps. Toyota quality—it means your automotive investment is protected. Like all Toyotas, the Corolla 2-Door Sedan has unitized-body construction to help it stay tight long after you buy it. And plenty of anti-rust protection to help guard against corrosive road spray. Quality—a basic reason why we say, "If you can find a better built small car than a Toyota...buy it!"

©Toyota Motor Sales, U.S.A., Inc. 1977

PPG believes windows should become working parts of your home's energy system.

Whether your home is in the south or the north, PPG has an energy-saving environmental glass for your windows and sliding glass doors.

Where the climate is blistering, you can save air conditioning costs by as much as 17 percent by letting your home wear windows and patio doors made of Solarcool® Bronze reflective glass instead of clear glass.

Newest in the PPG line, Solarcool cuts way down on ultraviolet light, too, which is a major cause of fading. Its beautiful mirrored face provides comparative privacy, and by reducing glare makes it a lot nicer to look out on a summer's day.

Up north, PPG Twindow® insulating glass uses two sealed panes to bring breathtaking winter scenes indoors while you breathe in comfort. Since it reduces heat loss through the glass more than 40 percent, it obviously saves energy. It cuts messy condensation. And if you want to save even more, add storm windows for triple glazing.

Let PPG glass become part of your energy-saving system. Ask your builder or architect. Either one will be glad to help you. PPG Industries, Inc., Dept. N-158, One Gateway Center, Pittsburgh, Pa. 15222.

PPG: a Concern for the Future

PPG
INDUSTRIES

Free. How to get a grip on your business travel problems before they get out of hand.

Getting key people where they're needed, when they're needed, at a reasonable cost, is a problem your company faces every day.

And it's getting worse.

But there is something you can do.

You can get your hands on one of the most interesting, informative, and downright provocative kits ever put together on the subject of business travel.

It's the Beechcraft Business Flying Kit and it's free. All you have to do is ask for it.

But don't expect just another pretty piece of sales literature.

Instead, it's a hard-hitting, concise, and easy-to-read businessman's kit designed for one purpose. To help you make an initial evaluation of whether or not a company airplane can solve your business travel problems. In terms of time savings, expanded market coverage, and overall cost efficiency.

And it promises you straightforward answers to your most important questions about owning and operating a company airplane. How do you determine the need for one? What size should it be? Who will fly it?

The kit even helps you determine the actual net capital cost to your company of owning a business airplane, like the Beechcraft Baron 58TC shown here.

The comprehensive Beechcraft Business Flying Kit. Having it in your hand can be the best way to keep business travel problems from getting out of hand.

Send for it.

Get the kit that has already shown hundreds of companies how to control their travel costs. Write on your company letterhead to: Beech Aircraft Corporation, Dept. A, Wichita, Kansas 67201. Ask for our free Beechcraft Business Flying Kit, and please mention if you're a pilot.

Beechcraft
AVIATION CENTER

Member of General Aviation Manufacturers Association

The Beechcraft Baron 58TC. A big, comfortable 6-seat aircraft that travels over 280 mph, and can carry 1,000 pounds of people or cargo nonstop to destinations 1,000 miles away.

Know any friends who want to learn to fly? Tell them about the General Aviation Manufacturers Association **Take Off** Sweepstakes. They could win a $50,000 airplane just for earning their private pilot license. Have them call Beech "TAKEOFF" TOLL FREE, 24 hours a day every day: USA 800-447-4700 (in Illinois, 800-322-4400); Canada 800-261-6362 (Toronto, 800-445-2231) and ask for the Beechcraft TAKEOFF operator.

"THE BEST REASON FOR BUYING A NEW GE REFRIGERATOR IS AN OLD GE REFRIGERATOR."

—The Steele Family.

Jane Steele
Verona, New Jersey

GE refrigerators are really built to last. And my old "Monitor" is lasting proof!

My sister-in-law's Aunt Agnes bought it in 1934. Talk about a great investment!

It was handed down to me in 1957, and I nearly didn't take it, I thought it was so old. But after 21 years as our second refrigerator, it still works like a charm!

And aside from a new door seal my husband put on, it hasn't needed one repair.

Of course, it doesn't have all the improvements and innovations GE's added over the years. Like automatic defrosting. And an ice dispenser on the door.

But it really gives me confidence in the reliability and dependability of General Electric products. I told Mary Ellen, get a GE. They can't be beat, really.

Great Aunt Agnes Spina
West Orange, New Jersey

I've spent nearly half a century depending on GE refrigerators.

We bought one of these GE refrigerators in the mid-fifties, after we decided to get up to date and give away the faithful old 1934 GE "Monitor" Jane has now.

What a workhorse! Why, our son and his friends must have opened this door thousands of times.

Soda was always cold, ice cream stayed hard. And, would you believe, it never needed any service.

So naturally, when we modernized again five years ago, we went right back to GE for a big, beautiful side-by-side.

We love how well General Electric refrigerators hold up. We've had enough of them to know!

Mary Ellen Steele Burns
Totowa, New Jersey

General Electric is a name you grow up with. You know it's reliable and dependable.

And with GE, the lower-priced refrigerators give you the same quality and reliability as the most expensive models. I wouldn't feel that same confidence with other brands.

Ours has all the features we need, at a medium price. Plus a fantastically large freezer. Automatic defrosting. And four adjustable shelves.

When we were looking for a refrigerator a year and a half ago, my mother told me GE was the best kind to get, and I value her opinion. And of course we did quite a bit of shopping around.

But no other brand had the features GE did for the same money. Or was as nice-looking, inside and out.

Suzanne Steele Walsh
Morristown, New Jersey

Having had General Electric refrigerators in the family for so long impressed me more than any brochure or sales talk.

So when we buy our new refrigerator, it won't be a question of "whether GE," but of "which GE."

And I think I know which—this gorgeous dream of a side-by-side!

It has plenty of space, which is important with our five children. And adjustable glass shelves, great for cleaning up spills.

The GE dispenser gives you chilled water, ice cubes, even crushed ice, without opening the door.

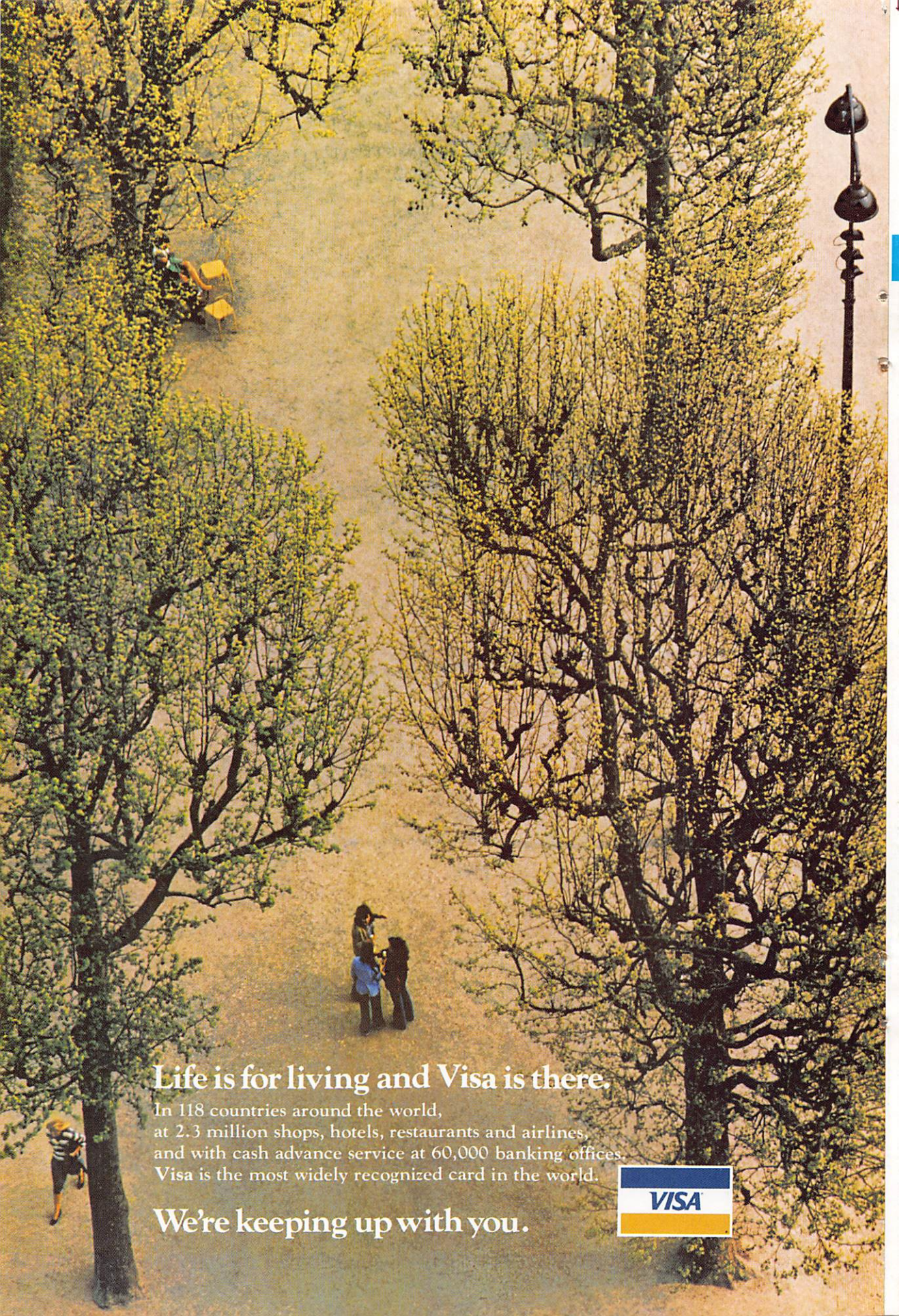
There's a separate temperature control for the meat pan. Automatic defrosting, of course.

And I love the 'New Naturals'™ colors—so soft!

The reliability General Electric's been building into their refrigerators since Great Aunt Agnes bought hers makes me feel really confident. Maybe some day *my* GE refrigerator will become a family heirloom too!

THE APPLIANCES AMERICA COMES HOME TO.

GENERAL ELECTRIC


Life is for living and Visa is there.
In 118 countries around the world,
at 2.3 million shops, hotels, restaurants and airlines,
and with cash advance service at 60,000 banking offices.
Visa is the most widely recognized card in the world.
We're keeping up with you.
VISA

THE PEACEFUL and open status of our borders with Canada and Mexico is a matter of national pride. Yet both of those borders have been sources of conflict in the past. It was only 62 years ago that a U. S. force under Gen. John J. Pershing pursued Pancho Villa's raiders back into Mexico as that nation groped its way through a confused and bloody revolution.

Last year we published Peter T. White's "One Canada—or Two?" Reader response was pronounced, and a theme that ran through our correspondence was an awakening to events on our doorstep. So occupied has the U. S. been with the unfurling of history in Southeast Asia, Africa, and the Middle East that portentous changes close to home were going relatively unnoticed.

In this issue we present a companion piece, Mike Edwards's article on Mexico. And again, it is with a certain shock of recognition that we remind ourselves of events not 10,000 miles away but next door.

For decades, despite a common border, the national destinies of the United States and Mexico seemed separate. While settlers in the United States were spreading a homogeneous culture across a continent (and overwhelming the native Indians in the process), Mexico was creating an amalgam of peoples of whom some 90 percent today have Indian blood, and who use dozens of languages in addition to Spanish.

Each year Mexico and the United States are drawn closer together. Mexico looks to her northern neighbor for foreign income and industrial technology. Jobs, both from U. S. firms operating within Mexico and for Mexicans employed in the U. S., are a basic Mexican need. The increasing numbers of jobless who try to cross the border illegally give ample proof of that.

A border shared in peace represents a shared opportunity. If it is a barrier that seems to separate cultures and problems, it can also be a tie that binds in the search for hemispheric unity and progress.

Like brothers in a busy household, these two nations have passed through a period of mutual indifference and now begin to look upon each other not only with friendship and support, but also with renewed respect and due regard for the other's rights.

Gilbert M. Grosvenor

NATIONAL GEOGRAPHIC

THE NATIONAL GEOGRAPHIC MAGAZINE VOL. 153, NO. 5
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May 1978

Alone Across the Outback 581
With four camels and a dog named Diggity, young Robyn Davidson ventures 1,700 miles across Australia's western wilderness. Photographer Rick Smolan records high and low points of her extraordinary journey.

Mexico: Its "Beautiful Challenge" 612
A bonanza of newfound oil lifts hopes of a culturally rich but land-poor nation plagued by unemployment. Mike Edwards and Thomas Nebbia assess its prospects today.

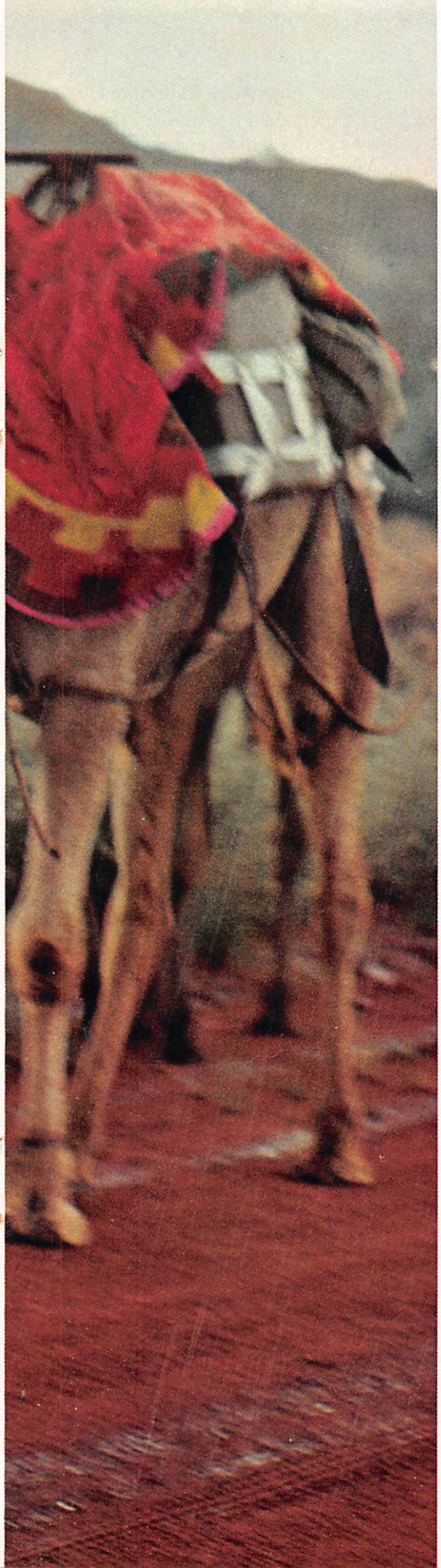
. . . Its Lively Folk Art 648
From papier-mâché devils to painted saints, vibrant creations of self-taught craftsmen preserve centuries-old artistry. Ethnologist Fernando Horcasitas surveys their work, photographed by David Hiser.

Hawaii's Wildlife Paradise 670
Lonely outcrops of coral and lava far west of the main islands shelter seals, turtles, and millions of birds. John L. Eliot and Jonathan Blair explore a little-known ocean realm.

Nashville: More Than Music 692
An upbeat theme resounds in unexpected aspects of "Music City, U.S.A." Michael Kernan and Jodi Cobb capture the harmony.

Holland's Beautiful Business of Tulips 712
Four centuries of bulb culture have made those early spring flowers an economic mainstay of the Netherlands, where their beauty once nearly led to financial ruin. By Elizabeth A. Moize and Farrell Grehan.

COVER: *Affection as well as discipline for her humped pack animals brought Aussie Robyn Davidson safely to journey's end. Photograph by Rick Smolan.*



By ROBYN DAVIDSON

Photographs by
RICK SMOLAN
CONTACT PRESS IMAGES

ALONE

Daring the harsh and beautiful Australian outback, a young woman makes a remarkable journey across half a continent. This compelling account is based on her diaries.

We must have made an odd sight—a woman, four camels, and a dog—as we traveled some 1,700 miles across Australia's western wilderness. But what better way to cross a desert than by leading or riding a camel? Some times were miserable, like the day of pouring rain (**left**) when one camel slipped and hurt a leg. Other times were euphoric, days of extraordinary freedom.

SOME STRING somewhere inside me is starting to unravel. It is an important string, the one that holds down panic. In the solitude of the desert night I feel the patter of rain on my sleeping bag—too light to lay the dust, too heavy for normal sleep. Sometime before midnight I come fully awake, and cannot find myself. There is neither in nor out, up nor down. I do not know where, or who, I am.

Inside me I hear three different voices. The first says, "So this is it, you've finally lost it. Good-bye." The second voice urges, "Hold on, don't let go. Be calm, lie down and fall asleep. You will find yourself again."

The third voice is screaming.

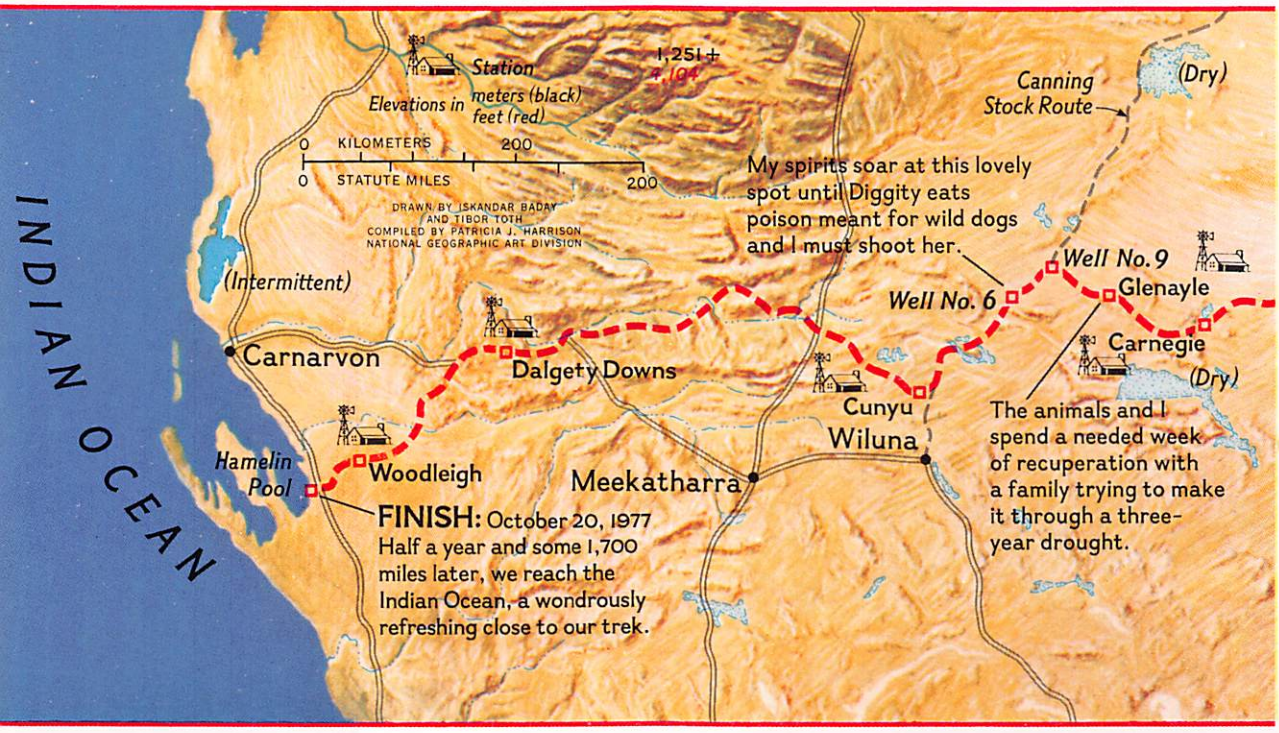
At dawn my dog, Diggity, licks me awake. The sky is cold and pitiless, like a psychopath's eyes. My four camels stand hobbled nearby—welcome, familiar shapes.

Instinctively I start the morning routine—boil the tea, pack the gear, saddle the camels—and head south once more. It is my 71st day of travel across Australia's western desert. Slowly, as we get under way, the strings inside me knit together and I know who I am again.

During the following four months on the trail the voices never returned, and in time I came to enjoy the silence and solitude of the desert. Australia's arid western region, from the town of Alice Springs to the Indian Ocean coast, is a beautiful, haunting, but largely empty land (map, below). Dominated by the harsh, almost uninhabited Great Sandy and Gibson Deserts, the region is known only to Australian Aborigines, a handful of white settlers, and the relatively few travelers who motor across it.

Why cross it by camel? I have no ready answer. On the other hand, why not? Australia is a vast country, and most of us who live there see only a small fraction of it—the large coastal cities, interior towns, or recreation areas, nearly all of them connected by surfaced roads. Beyond the roads, in the area known to Australians as the outback, camels are the perfect form of transport. One sees little by car, and horses would never survive the hardships of desert crossings. For me, the only choice was camels.

Three years ago, at the age of 25, I gave up my study of Japanese language and culture at university in Brisbane and moved to the town of Alice Springs. I planned an expedition alone from Alice Springs to the Indian Ocean, a distance of some 1,700 miles.


INDIAN OCEAN
Station
Elevations in meters (black) feet (red)
1,251+
4,104
0 KILOMETERS 200
0 STATUTE MILES 200
DRAWN BY ISKANDAR BADAY AND TIBOR TOTH
COMPILED BY PATRICIA J. HARRISON
NATIONAL GEOGRAPHIC ART DIVISION
Canning Stock Route
(Dry)
My spirits soar at this lovely spot until Diggity eats poison meant for wild dogs and I must shoot her.
Well No. 9
Glenayle
Well No. 6
Carnegie
(Dry)
(Intermittent)
Carnarvon
Dalgety Downs
Cunyu
Wiluna
The animals and I spend a needed week of recuperation with a family trying to make it through a three-year drought.
Hamelin Pool
Woodleigh
Meekatharra
FINISH: October 20, 1977
Half a year and some 1,700 miles later, we reach the Indian Ocean, a wondrously refreshing close to our trek.

The very first requirement was camels.

For nearly a century, from the 1860's until recent times, camels were commonly used in the outback. The animals, imported from Afghanistan and India, proved highly successful until cars and trucks began to replace them in the 1920's. Many camels were then simply turned loose to roam the outback, where I was to find they can present problems for travelers.

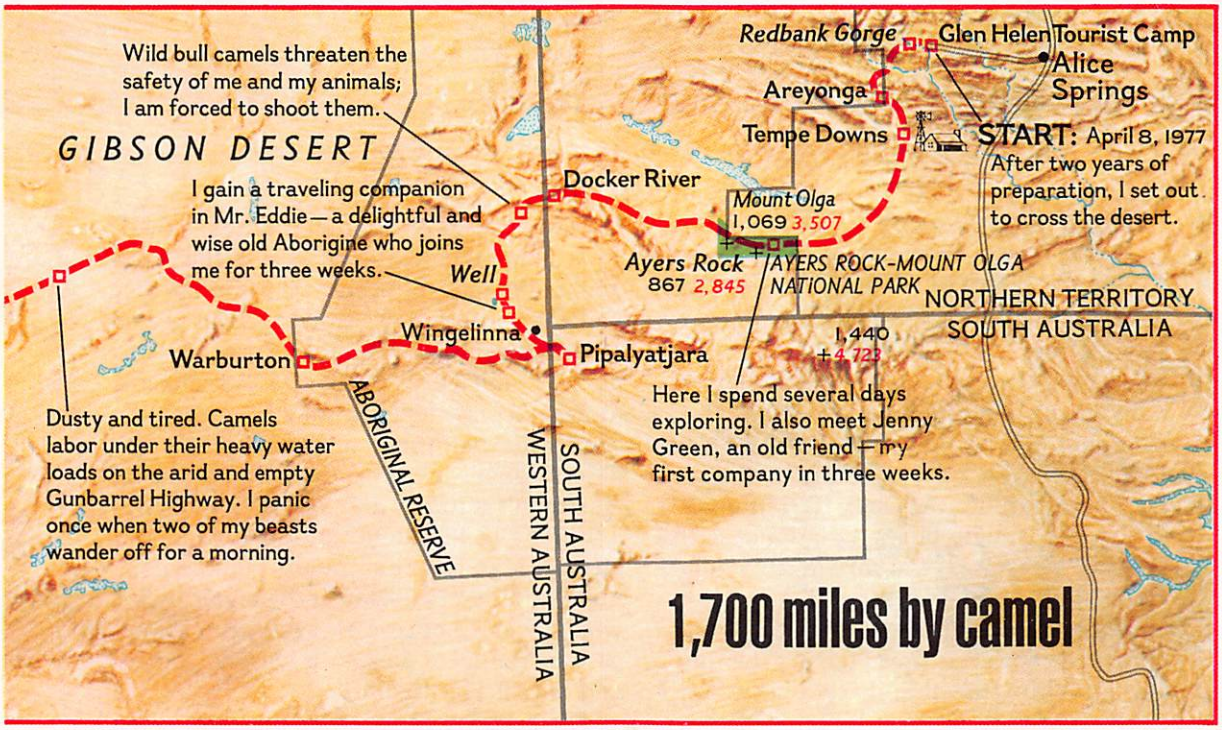
Camels are still trained in Alice Springs for tourist jaunts and for occasional sale to Australia's zoos. Sallay Mahomet, an Australian-born Afghan and a veteran handler, agreed to teach me something about the art of camel training.

I WORKED with Sallay nearly three months, for camels are not the easiest of beasts to train. To begin with, they can kill or injure you with a well-placed kick, and their bite is as painful as a horse's. Patiently Sallay taught me to understand camel behavior—how to feed, saddle, doctor, and control the animals, the latter by kindness, discipline, and use of a noseline attached to a wooden peg inserted through the animal's nostril (page 593). Camels are similar to dogs; a well-trained one answers best to its accustomed handler. For an expedition such as mine, it was essential that I do most of the training.

Through part-time jobs, loans from friends, and finally with support from the National Geographic Society, I acquired the necessary equipment and four good camels: a mature, gelded male whom I named Dookie; a younger gelding, Bub; a female, Zeleika; and her calf, Goliath. Training and preparations took more than a year, but finally in early April of last year I was ready.

My friends were not. Sallay, for one, was concerned about the trip. "Not many people have tried it alone," he said. "You'd do better with a friend along. What if you get sick or break a leg out there?" But gradually he came around, as did other friends, to the idea that I could make it.

On April 8, 1977, Sallay and my father—who had come from Brisbane to see me off—trucked me, the camels, and my dog, Diggity, to Glen Helen Tourist Camp, 80 miles west of Alice Springs. From there I journeyed to nearby


Redbank Gorge
Glen Helen Tourist Camp
Alice Springs
Areyonga
Tempe Downs
START: April 8, 1977
After two years of preparation, I set out to cross the desert.
Wild bull camels threaten the safety of me and my animals; I am forced to shoot them.
GIBSON DESERT
Docker River
I gain a traveling companion in Mr. Eddie—a delightful and wise old Aborigine who joins me for three weeks.
Mount Olga
1,069 3,507
Ayers Rock
867 2,845
AYERS ROCK-MOUNT OLGA NATIONAL PARK
NORTHERN TERRITORY
SOUTH AUSTRALIA
Well
Wingelinna
Warburton
Pipalyatjara
1,440
+4,723
Here I spend several days exploring. I also meet Jenny Green, an old friend—my first company in three weeks.
Dusty and tired. Camels labor under their heavy water loads on the arid and empty Gunbarrel Highway. I panic once when two of my beasts wander off for a morning.
ABORIGINAL RESERVE
WESTERN AUSTRALIA
SOUTH AUSTRALIA
1,700 miles by camel

Like great loaves of bread clustered on the horizon, the Olgas served as a

Redbank Gorge, pausing long enough to say good-bye to my closest friends and helpers from Alice, who had all gathered there: Toly Sawenko, Jenny Green, Peter and Margaret Latz. Then I was off for Australia's west coast, alone except for the intermittent company of photographer Rick Smolan.

DAY 1 That first full day on the trail was both exhilarating and terrifying. My initial stop was to be the Aborigine settlement of Areyonga, via an old abandoned track that wandered through dry, stony creek beds and gullies and often simply disappeared. A dozen times during the day I was struck by the chilling thought, "Am I lost?" It was to become an altogether too familiar question in the months ahead.

At sundown I camped beside the track and estimated my progress: 20 miles. Not bad for the first day's trek, and only some 1,680 left to go. After hobbling the camels to graze, I built a brushwood fire and cooked a dinner of tinned stew. The blaze was welcome, for nighttime temperatures in the desert can drop to below freezing during Australia's autumn and winter seasons.

Finally I slid into my sleeping bag under an extra blanket or two and spent most of the night alternately dozing and wondering if I would ever see my camels again. But the occasional sound of their bells was reassuring, and at last I drifted off.

The next morning settled one worry; the

reliable guide one day. In this sandhill country I could make 20 miles before camp.

camels seemed more scared than I was. I awoke to find them huddled as close as possible around the swag and Diggity snoring happily beneath the blankets.

DAY 4 In the afternoon we reached Areyonga, all slightly the worse for wear. My feet were blistered and my muscles were cramped. Diggity, too, was footsore and had to ride for a spell on Dookie's back, an indignity the dog could scarcely bear.

Zeleika was a complete mess. Her hindquarters were weak, her nose was infected, and she had a huge lump in a vein leading to her udder.

Bub was still uncertain about the whole thing. During those first days he had shied in terror not only at rabbits but even at rocks and leaves. He obviously wished he were home safe and sound.

Dookie was the only one without grumbles; he was having a great time. He continually smiled to himself, regarded everything around him with satisfaction, and stepped high when he walked. I suspect he has always wanted to travel.

After four days of total solitude Areyonga came as a shock, though a pleasant one. A mile outside the settlement we were greeted by a welcoming throng of Aborigine children, shouting, giggling, and begging for rides. Seemingly hundreds of small hands reached out to pat Diggity when she was allowed down from exile atop Dookie's back,

and there was endless tickling of camel legs.

For three days I rested at Areyonga, worrying about Zeleika, Bub, and Goliath. I wondered what the next 30-mile stretch to the homestead at Tempe Downs would do to us all. Dookie, of course, viewed the whole thing with lofty unconcern.

Sick or well, the camels proved a key to communication with the Aborigines. The people of Areyonga belong to the Pitjantjatjara tribe, who used camels for walkabout until cars and trucks finally replaced the animals. Yet many fond memories and stories of camels survive.

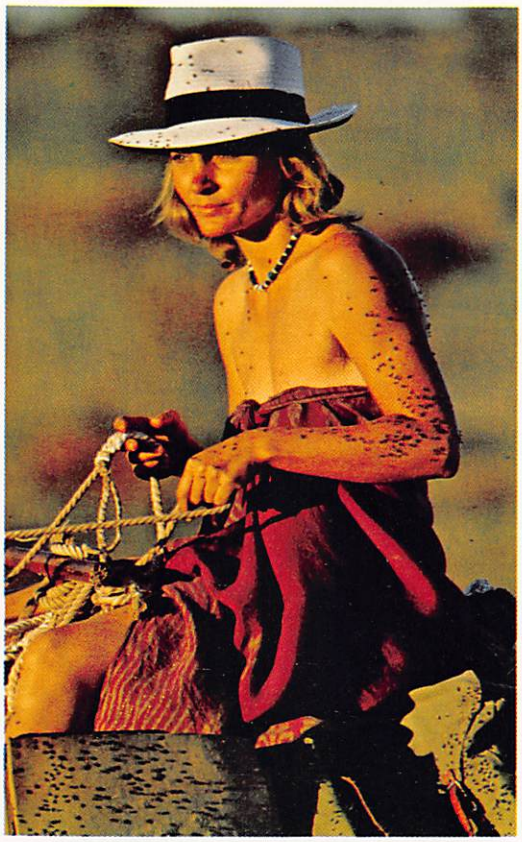
The few stumbling phrases of Pitjantjatjara I had learned in Alice Springs brought gasps and a good deal of laughter from my new friends. I discovered that before I had reached Areyonga, word had spread that *Rama-rama*—a term meaning "crazy person" in a relatively kind sense—spoke fluent Pitjantjatjara!

DAY 8 A few Aborigines accompanied us out of Areyonga for the first ten miles toward Tempe Downs. Bidding me goodbye, my companions warned that the route over the mountains was an old one, unused for many years. I promised to call from Tempe Downs over the "flying doctor" radio, the emergency medical network that links Australia's outback settlements.

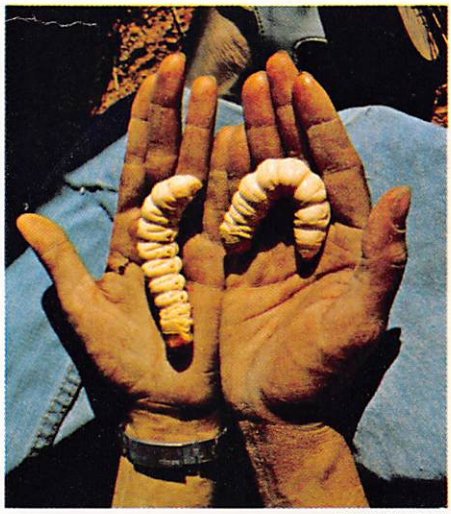
My friends didn't exaggerate. After 15 miles the mountain track occasionally began to peter out, and I spent hours sweating over maps and compass. I took a couple of wrong turns into a dead-end canyon and had to backtrack out.

The strain of uncertainty carries over into the unconscious, and I dreamed continually of being lost. Without the almost human companionship of Diggity and the camels, I'm sure I'd be in those mountains still, muttering and stumbling around in circles.

To complicate matters, Bub chose the mountains to throw an unforgettable fit. Shortly after a midday pause he decided to buck the entire 500 pounds of assorted swag, tucker, and water drums off his back. As each article crashed to the ground, the more terrified Bub became and the harder he bucked. Finally he stood petrified, the dislodged saddle hanging under his belly and the items from the pack scattered for miles.



My desert education taught me soon enough to get used to flies (**above**). They don't bite, but at times I literally scraped them out of my eyes. I also learned to dine on witchetty grubs (**below**), moth larvae I found in tree roots. Most important, I discovered that camels make lovable friends if treated right—though they're not above conning a meal (**right**).



ROBYN DAVIDSON

Despite the setbacks, we made it to Tempe Downs in three days and marked our 100th mile from the starting point at Glen Helen. After a radio call to my friends at Areyonga, I filled my drinking-water bag with rainwater and set off for Ayers Rock, 150 miles to the southwest.

We were entering sandhill country, an expanse of great motionless waves of reddish sand stretching mile after square mile ahead of us (pages 598-9). The effect was pleasing, but some of the local inhabitants were not. Flies by the zillions engulfed us in dense clouds, covering every exposed square centimeter of human, dog, or camel flesh. Although they didn't bite, they crawled under eyelids, into ears and nostrils, and when they finally gave up at night, clouds of mosquitoes took over.

The country itself was exquisite. Huge stands of desert oak that lined the valleys among the hills sighed, whispered, and sang me to sleep at night. There were varieties of flowers, plants bearing strange seedpods, and other plants adorned with what looked like feathers.

Two bizarre residents of the sandhills intrigued me. One is a type of ant known as the inch ant, a monstrous thing nearly three centimeters long, with a very aggressive nature, eyes that stare into your own, and fangs that look like spanners.

The other creature, whose name I do not know, is the most endearing little beetle I have ever met. He's an unprepossessing chap to look at, and when he sees something coming toward him (I imagine that four camels, one human, and a dog would be somewhat frightening), he buries his head in that bright red sand, sticks his bottom in the air, and waits till you have either crushed him or missed. I always tried to miss, but Diggity and the camels. . . .

DAY 21 After 250 miles of travel from Glen Helen, we reached Ayers Rock. Among the mass of tourists who fly or drive in to see the great natural wonder, I found Jenny Green, my friend from Alice Springs, who had come to meet me. We talked—or rather, *I* talked—for four straight days. Having traveled for most of three weeks without company, I had undergone considerable change without realizing it. I babbled on to Jenny like a madwoman, and, as is often the case, one makes oneself better by making others sick. Dear Jen. She flew home feeling depressed, and I rode out of Ayers Rock feeling on top of the world!

THE NEXT 140 miles, to the settlement of Docker River at the eastern edge of the Gibson Desert, went smoothly until the weather dealt us an almost fatal blow. So far I had not encountered rain and had wondered how the camels would take to the bright orange plastic raincoats I had designed and made to cover their packs.

Just past the area known as Lasseter's Country, heavy clouds began to bustle over the horizon. Down it came. It rained cats and dogs. It rained elephants and whales, and it hailed. Within an hour the track was a running river and we were all drenched, though the camels soon grew accustomed to the flapping of their orange raincoats.

Camels have feet like bald tires. They simply cannot cope with mud, and leading them over precariously slippery patches is painful and exhausting to both driver and animal. In the midst of the storm Dookie, my best boy, my wonder camel, who was last in line, suddenly sat down with a thud and snapped his noseline.

I went back to him and tried to get him up. He refused. I shouted at him and had to kick the poor beast until he groaned to his feet. To my horror I saw that he was limping. It looked as if the trip was over.

We made it to Docker River in painful stages. Each night in camp along the way I cut shrubbery for Dookie and brought it to him. I massaged his shoulder, I cuddled him, kissed him, shed tears, and begged him to get better. To no avail. The thought of perhaps having to shoot my best camel

Irresistible to exploring, a bizarre cave on the northern face of Ayers Rock gave me an excuse to rest the camels and do some rock-climbing of my own. As the trip wore on, I worried less and less about structured time, until the day came when I rode out of camp and left my clock ticking on an old tin can.

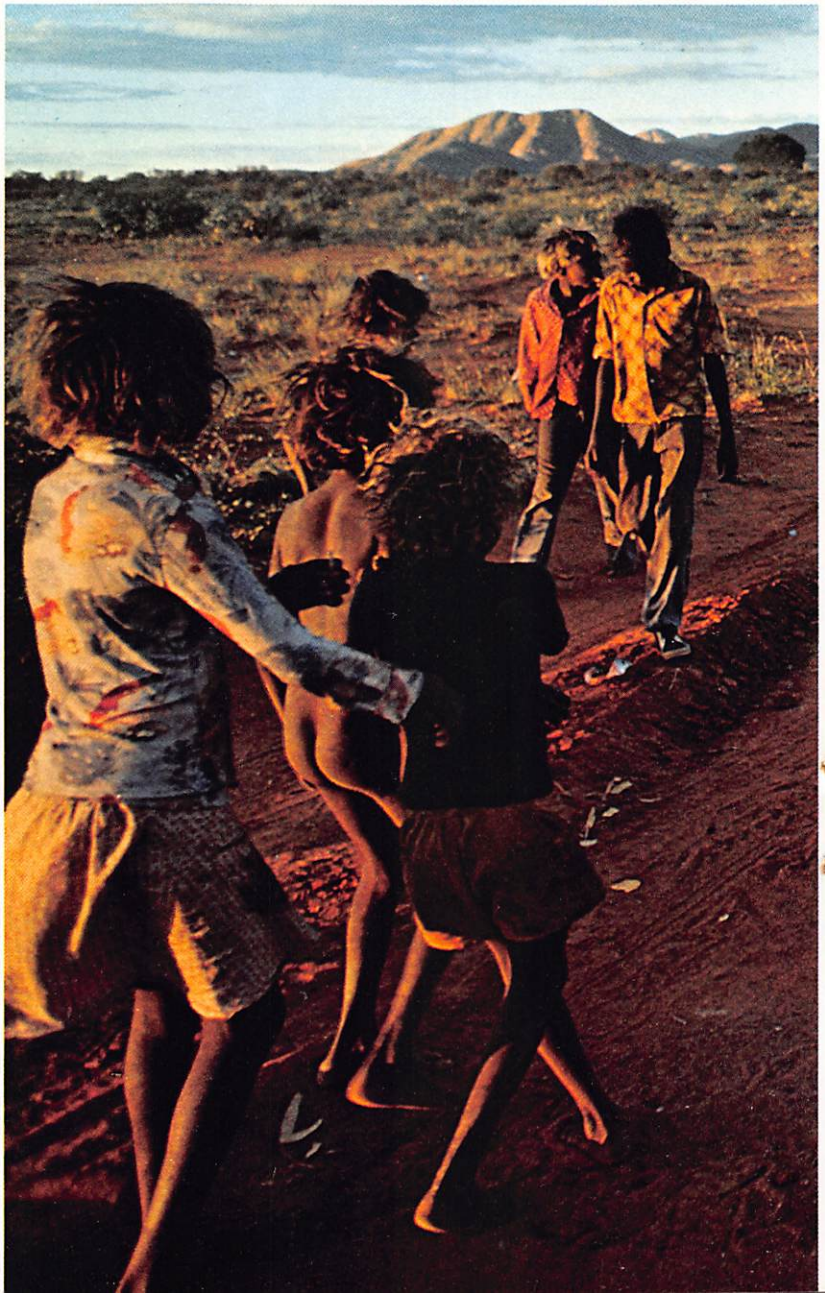
gnawed away at me. Slowly, painfully, miserably, we limped into Docker River.

In the end it took Dookie a month to recover from what probably was a torn muscle in his shoulder. I never really diagnosed it, but at one point I even flew back to Alice Springs to consult with the veterinarian there. For good measure I consulted with a doctor, a dentist, a chiropractor, and some of the Alice Springs hospital staff, but since none of them could examine Dookie, the answer was always the same: "Wait and see."

Docker River is an Aborigine settlement, and the people were wonderfully hospitable. My few phrases of Pitjantjatjara were put to good use when I joined them in hunting, dancing, and gathering insects and wild plants for food.

DAY 69 At last Dookie had improved enough to travel, and that morning we set off westward into the Gibson Desert. Before we had covered many miles some wild camels suddenly appeared.

I had been warned about these creatures by my friend Sallay Mahomet, the Alice Springs camel trainer. "Make no mistake," Sallay had said, "wild bull camels can kill you when they're in rut. They will try to take a female, and if you are in the way, you'll be



I was a hero, a celebrity, when I walked into the community of Docker River. Aborigine children were running and jumping and dancing; there was a great tumult. Word was out that a white woman was crossing the desert by camel, and to my surprise the entire population turned out to greet me. I never looked upon what I was doing as anything but a good, yet ordinary, adventure. I wanted to see the desert; I wanted to learn about camels; I wanted to be with the Aborigines.

At this early point, however, I thought the trip might well be over. Dookie, the camel in the rear, was limping badly from a fall. Yet he healed after a rest of four weeks here. Hospitality cured my blues as well, and once again, because of friends I met along the way, my journey was kept alive.

attacked. The only thing that will stop them is a rifle bullet. If the time should come, don't hesitate."

And now the time has come. Two hundred yards ahead stand three large wild bulls, obviously in season and aware of Zeleika. Faced with sudden danger, I find myself outside the situation, observing and talking to myself.

Panic and shake, panic and shake, Robbie D. Remember what Sallay said; take it a step at a time. One, tie up Bub, who will surely bolt, and sit him down. Two, carefully take the rifle from its scabbard. Three, load and cock. Four, aim steady and fire.

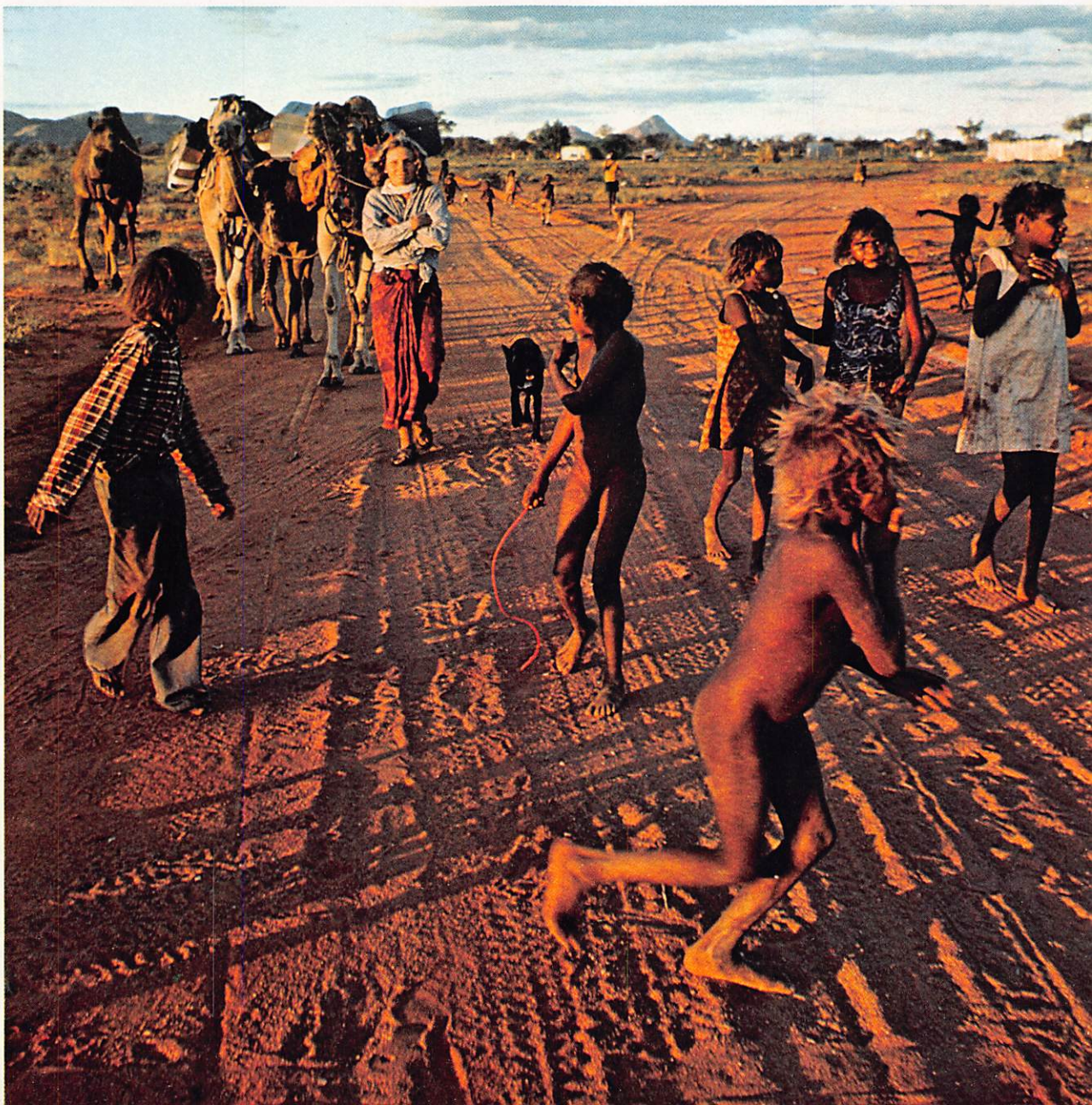
By now the bulls are only 30 yards away. One spurts a small cylinder of blood where his heart should be. He seems to be stopping, thinking. All three come forward again.

Zzzt. This time just at the back of the wounded one's head. It hurts, and he turns and ambles away. The other two seem puzzled at his behavior.

Zzzt. This time in the heart, I'm sure of it. But he's only down, just sitting there.

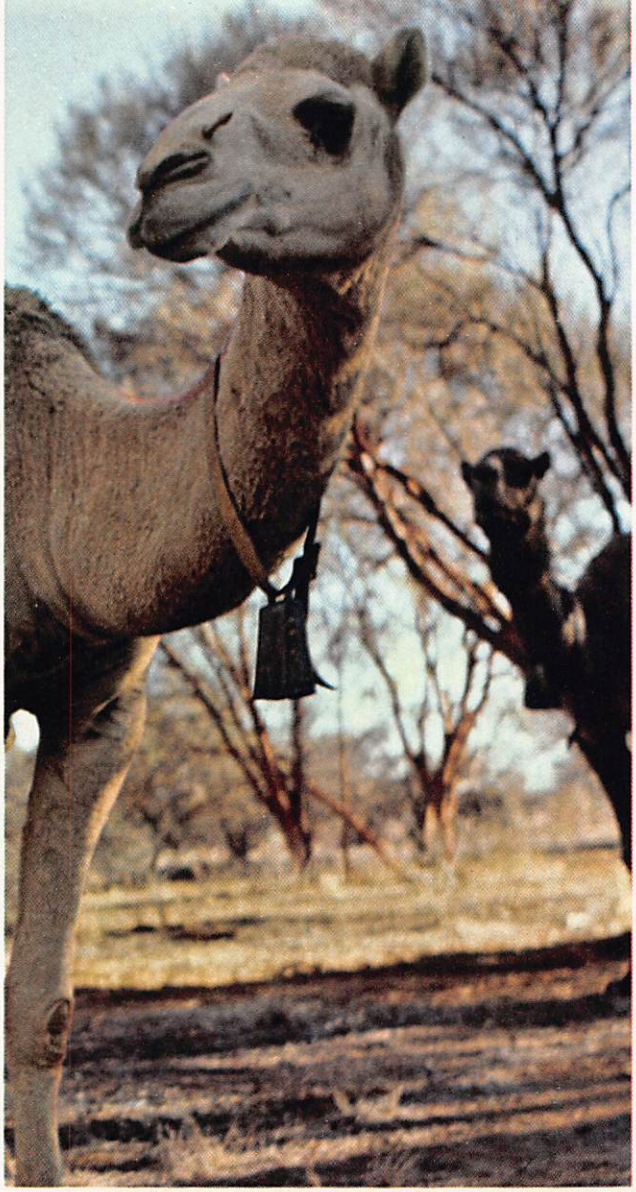
Zzzt. At last, in the head, and it's over. The other two bulls trundle off.

Darkness comes too quickly. I hobble the camels and try to keep them close. The campfire flickers on white sand washed with



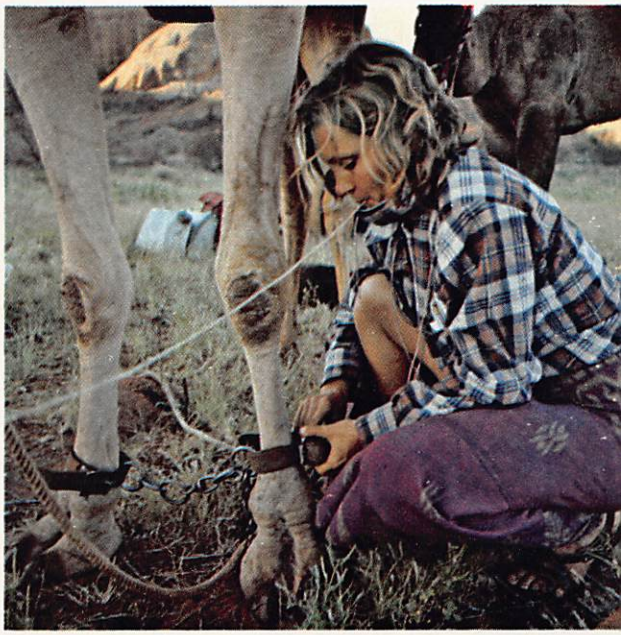
One on one with a pet camel can be a serious match, requiring discipline, but more often than not it was a game we played, as when cheeky Bub tried to raid my gear (**above**).

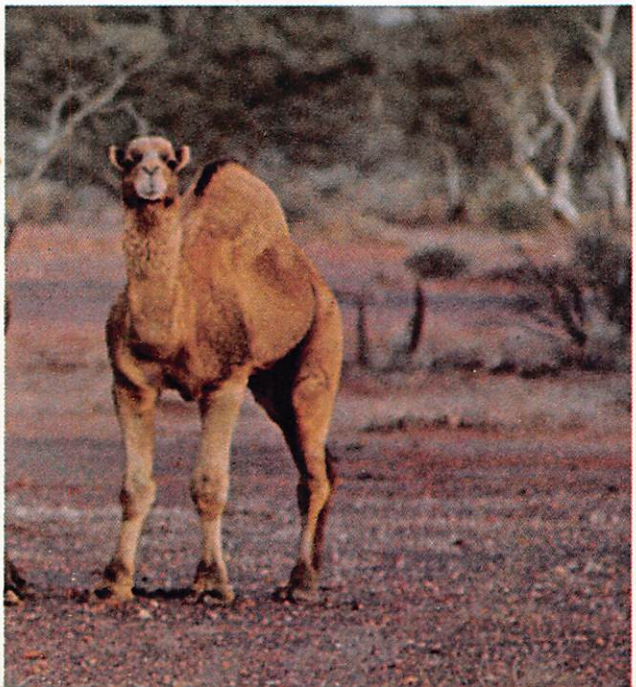
It was far from a game, I learned, when a herd of wild camels (**right**) approached. Wild bulls in rutting season are dangerously unpredictable, and might trample me and my camp in their ardor to reach my female camel, Zeleika. Sometimes I could scare them off with a warning shot, but on occasion I was forced to kill these beautiful animals. I hated it. But I had to think of my survival.

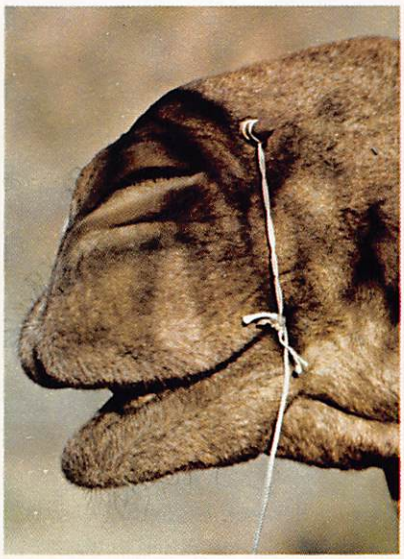


Golden rule of making camp is: Attend to the animals first. After pulling off saddles, I hobbled the camels (**below**) so they could browse for food and yet, in theory, not stray far. Then at night I prayed I would hear their bells in the morning. Once two camels did wander off; I found the strays only after four panic-stricken hours.

A year working at a camel farm taught me how to make a nose peg, a wooden knob implanted in the nostril (**bottom**). Since camels are cud chewers and can't use bits, a noseline is the best way to control these independent-minded characters.







Nothing is ahead but the horizon on the Gunbarrel Highway. Few vehicles travel this desolate track across the Gibson Desert. After that, I was glad to see anybody.

moonlight. All night long I hear the rumble of the two bulls, endlessly circling the camp.

At dawn one of the two, a young and beautiful bull, stands fifty yards away in the scrub. I resolve not to shoot him unless he directly threatens me or my camels.

I round up Dookie, Zeleika, and Goliath, and turn for Bub, good old unreliable Bub. In a flash he is off with the new young bull, galloping despite his hobbles. For an hour I try to catch him and can't; the wild bull stays too close to him. It is Bub or the bull. End of resolve. This time, even through tears, my aim is straight.

DAY 71 It was on this night that I heard the three voices and thought I was going mad—perhaps from a combination of worry over my water supply, the terrible monotony of sandhill country, and the effect of having had to shoot the wild bull camels. But the feeling of madness passed with sunrise, and we journeyed on. My worry over water was real, for we were down to ten gallons—less than one-fifth of capacity. Walk, walk, walk, over one sandy hill, then the next. Somewhere ahead, according to my map, lay an artesian well with an abandoned windmill and storage tank.

Supposing I missed the well, or the water tank was dry? I would simply push the camels on to the next water, five days beyond. They could do it, I told myself. Uncomfortable, but they could do it.

Walk, walk, walk. Would the sandhills never end? How could I once have thought them beautiful? The strain began to tell, and I sobbed as I walked: "God, please, the windmill must be over the next hill. No? All right then, the next. It's *got* to be the next one. No. . . ."

Diggity licked my hand, whining, but I couldn't stop. I raved at the hills. Then we crested the last one, and the land flattened out. A patch of green shone in the distance.

Panic melted and I began to laugh, patting Diggity. No need to find the well and tank that night; they were there by the patch of green. So I camped, and, sure enough, next morning there were the windmill and the water tank. The camels drank, Diggity drank. And I drank. Then I had a freezing, early-morning bath. Laugh, splash, and gurgle, Robbie D. It was good to be alive.

DAY 75 This was a memorable day, for it brought the gift of Mr. Eddie. He is a Pitjantjatjara man, and he arrived at my camp that evening with several carloads of Aborigines from the settlements of Wingelinna and Pipalyatjara. I served them all billies of tea, and as we chatted, he caught my notice: a dwarfish man, little taller than five feet, with a straight back, a beautiful face, the most wonderfully expressive hands, and makeshift shoes on his feet.

My guests spent the night, and next morning they decided that one of them should accompany me to Pipalyatjara, two days' walk ahead. I kept a polite silence and simply started off—to be joined by the little man.

I turned then, and we looked at each other. There was such humor, depth, life, and knowledge in those eyes that somehow we started laughing. We laughed for five minutes, then he pointed to himself and said, "Eddie." I pointed to myself and said, "Robyn," which I think he mistook for "rabbit" since he pronounces that word "rarbin."

No matter. All that day and the next we communicated in pantomime and in broken Pitjantjatjara or English, falling into helpless laughter at each other's antics. I don't think I ever felt so good in my life. And so we came to Pipalyatjara.

Pipalyatjara is one of those rarities in the outback, an Aborigine settlement where the whites do a really splendid job of helping the Aborigines cope with prejudice, neglect, and government bureaucracy. Glendle Schrader, a friend from Alice Springs, is Pipalyatjara's community adviser, and we spent three days exchanging news. As I began packing for Warburton, 180 miles due west in the Gibson Desert, Mr. Eddie announced that he was coming too.

DAY 80 That morning we set off together, and after a mile or two Mr. Eddie insisted on a detour. He wanted to gather *pituri,* a native, narcotic tobacco plant that Aborigines chew, and we turned into a valley beside the trail. We searched in silence for several hours and, in my "white-fella" preoccupation with time, I began to wonder

Campfires kept me company at night as I listened to tapes of Aborigines and tried to learn Pitjantjatjara—the language most commonly spoken along my route. I cherished my solitude in the desert. Once when I felt terrifyingly alone at night, I woke to find an abandoned Aborigine camp nearby. I wondered if the spirits were out.

Playing nurse to a camel made me helpless at times. When Dookie hurt his leg, all I could do was hug and massage him until he decided to get up. When Zeleika began to bleed internally, I fed her 40 pills a day. My only injury was a sore hip from endless hiking over hills.

Our morning takeoff was a major operation. In the beginning it required as much as two hours to load the gear, which could amount to 500 pounds per camel with full water drums. Once the kneeling camels were packed, I would whisper a command, and in a series of graceful moves they would lift their hindquarters, then quickly pull up their front legs, and we were off.

if we would ever reach Warburton. But Mr. Eddie seemed to flow with time rather than measure it, and eventually I relaxed and began to enjoy my surroundings. It was not the least of lessons he was to teach me.

THE FOLLOWING day was either a disaster or a delight, depending on one's viewpoint. By afternoon we had trekked 15 miles and were tired, hot, dusty, and fly-ridden. At 3 p.m. on the trail I tended to get the blues. They weren't helped this time by a column of red dust that gradually rose on the horizon. Cars on the trail, though rare, frequently meant tourists, and I was in no mood to be gawked at today.

These were worse than usual. The car drew up beside us, and several men in silly hats spilled out, festooned with cameras.

"Hey, Bruce," one yelled, "come look at this gal, she's got a *safety pin* for an earring!"

"Will you look at those crazy sandals? And she's got a boong with her!"

Now "boong" is the white's racist term for an Aborigine, and Mr. Eddie is one of the finest people I have ever known. Temper sizzling, I pushed past the men's battery of lenses, and attention shifted to Mr. Eddie.

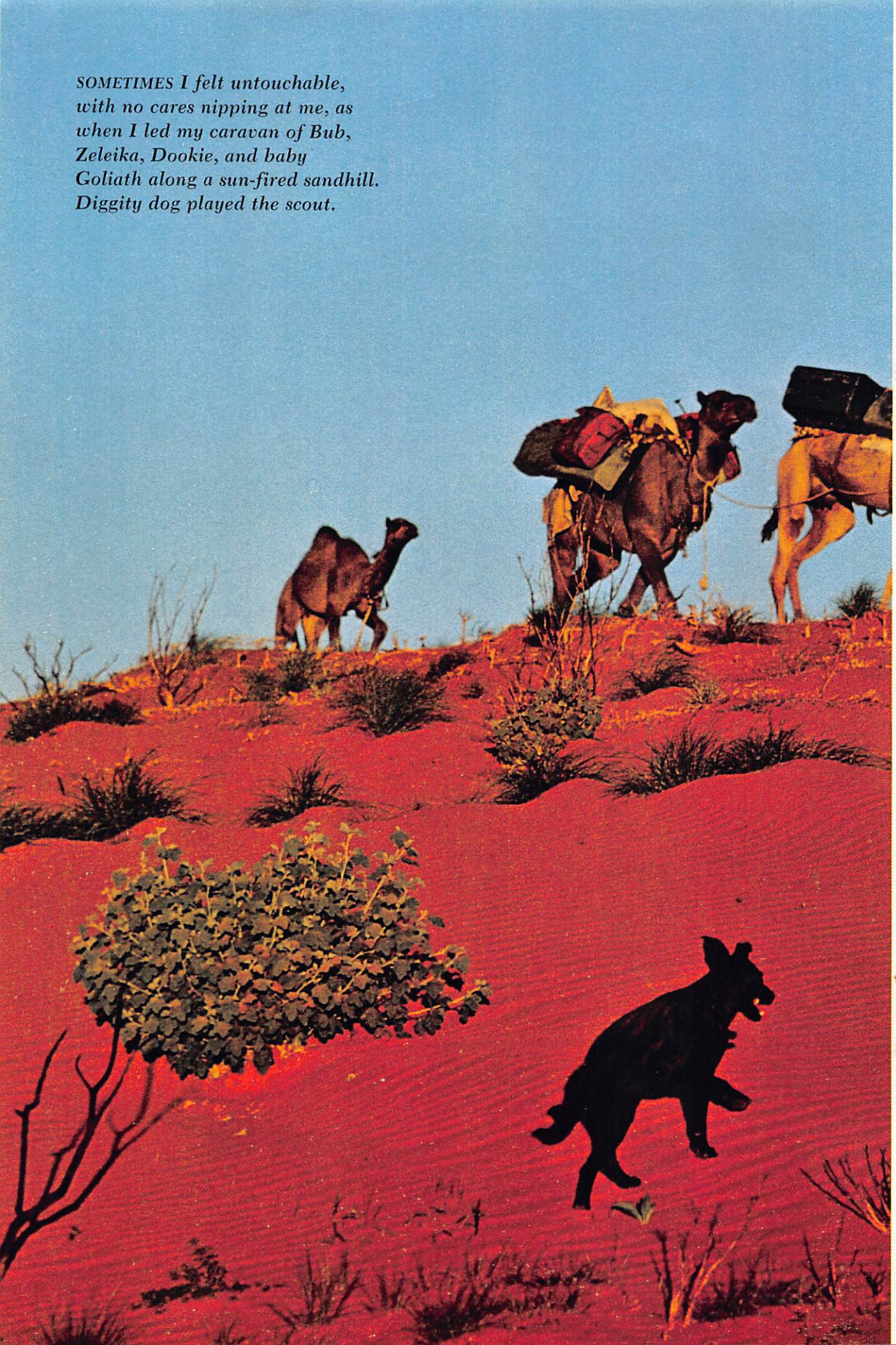
"Me take photograph longa you, Jacky-Jacky," one of the tourists announced in ghastly pidgin. "You stand by camel, there's a good boy."

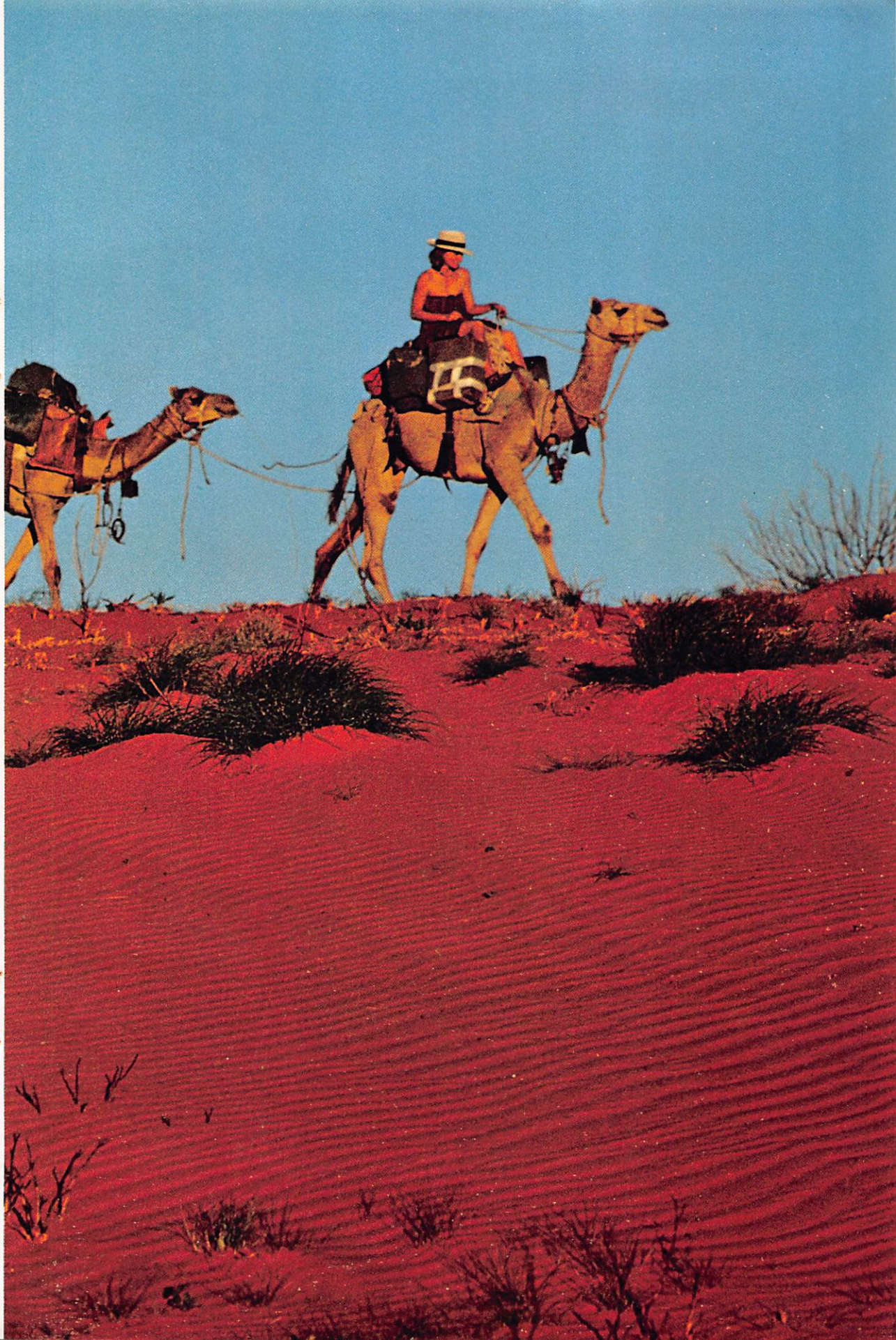
Behind me I caught the multiple click of shutters; then all of a sudden Mr. Eddie seemed to go berserk. Brandishing his walking stick and giggling insanely, he drove the tourists back to their car, alternately raving in Pitjantjatjara and demanding payment for the photographs in broken English.

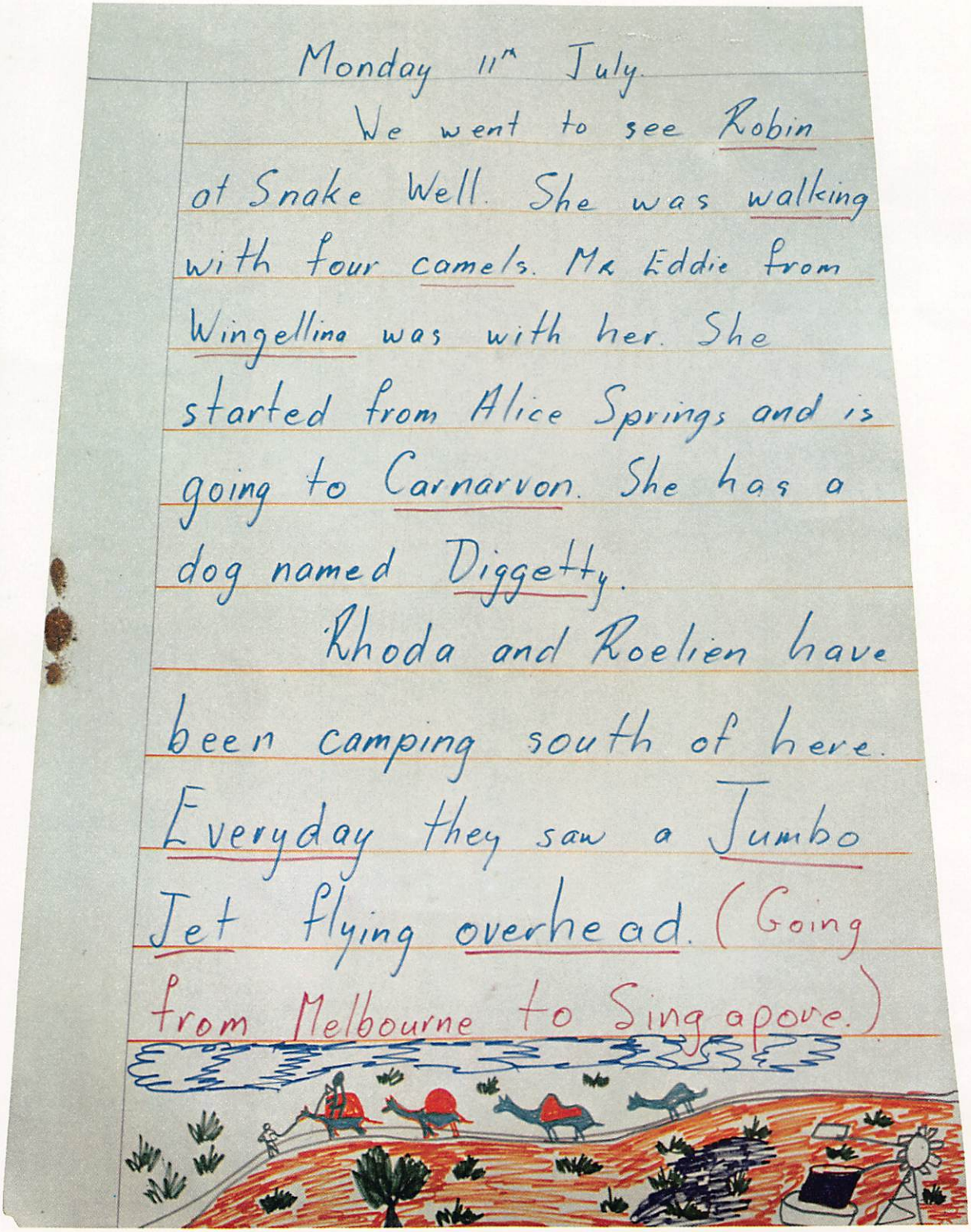
The startled men beat a hasty retreat, emptying their pockets of bills as they went. Mr. Eddie tucked the money away as the car vanished. Then he walked serenely over to me, and we cracked up.

With tears streaming down my face I thought of the Aborigines, how they had been poisoned, slaughtered, herded into settlements, prodded, photographed, measured, and left to rot with their shattered pride and their cheap liquor. And here was this superb old gentleman, who had lived through it all, *(Continued on page 602)*

SOMETIMES I felt untouchable, with no cares nipping at me, as when I led my caravan of Bub, Zeleika, Dookie, and baby Goliath along a sun-fired sandhill. Diggity dog played the scout.

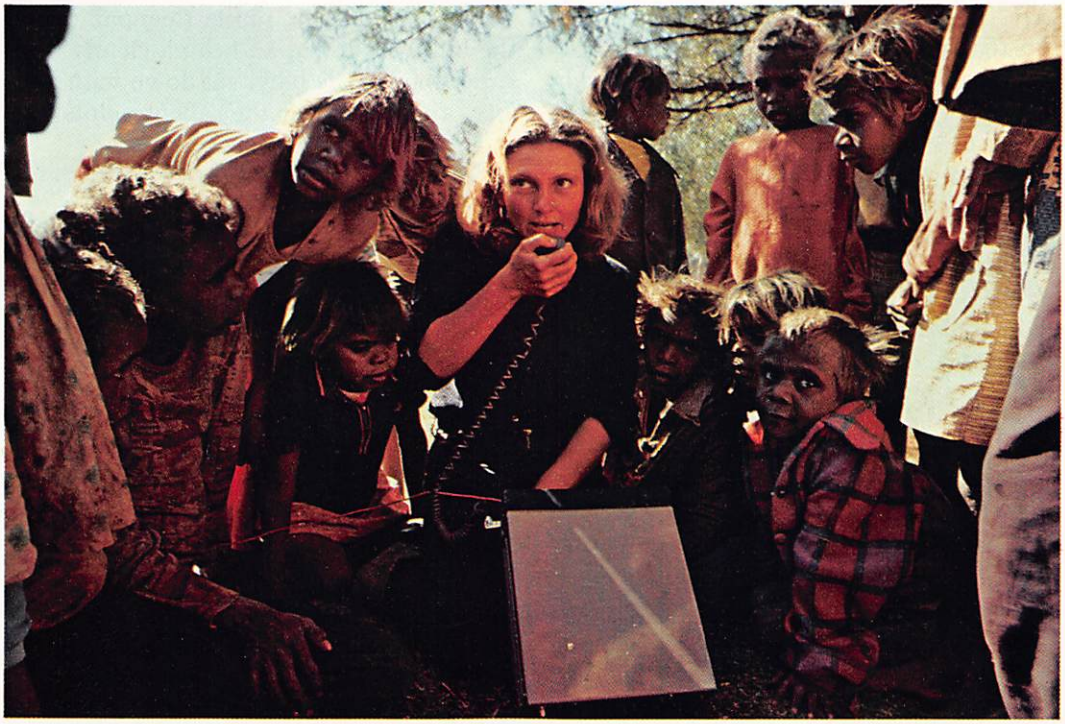





Monday 11th July.
We went to see Robin at Snake Well. She was walking with four camels. Mr Eddie from Wingellina was with her. She started from Alice Springs and is going to Carnarvon. She has a dog named Diggetty.
Rhoda and Roelien have been camping south of here. Everyday they saw a Jumbo Jet flying overhead. (Going from Melbourne to Singapore.)

My favorite news account of the journey appeared in the daybook at Warburton Ranges Primary School. Aborigine children, who followed me wherever I went, dictated the message to their teacher and then drew a picture of my desert train on its way.

At a low point of the trip, I met Mr. Eddie. I was camped outside Docker River, feeling that the journey had somehow become less dreamlike, less inspiring, when a group of Aborigines appeared and volunteered to send someone along with me. The someone was Mr. Eddie—a little man with talking hands. For the three weeks and 200 miles that he walked with me, he told me the names of birds and plants, the importance of places we passed. He taught me to laugh at my predicaments and not to be handcuffed by my obsession with time. As thanks, I gave him a rifle (**right**) like the one of mine he so adored. In Warburton I called on a friend by Australian Flying Doctor Service radio (**below**) to take Mr. Eddie home.



(*Continued from page 597*) who could turn himself into an outrageous parody of the Aborigine, then do an about-face and laugh with the abandon of a child. Reflecting on my own lesser problems and hardships, I thought: If you can do it, old man, me too.

DAY 94 We parted in Warburton, Mr. Eddie and I. I still think of our three weeks together on the trail as the heart of my entire journey. I had already arranged at Pipalyatjara to have a gun similar to mine waiting for Mr. Eddie at Warburton. He had fallen in love with my rifle, and it seemed the perfect gift.

The most dangerous part of the journey now lay ahead of me, the Gunbarrel Highway. We would travel 350 miles of the Gunbarrel's total 900-mile length, taking us across the forbidding Gibson Desert. The camels could not carry enough water to make it all the way, so my friend, Glendle Schrader, from Pipalyatjara would drive a truck with additional water from Warburton to the western part of the Gunbarrel. From Pipalyatjara the round trip comes to 800 hazardous miles, whether on foot or by motor. Such is the quality of friends.

So now, the Gunbarrel. I had been told at Warburton that in an average year only six vehicles pass over it, and I could easily see why. The track amounts to a pair of shallow ruts that only the sturdiest four-wheel-drive machine can negotiate (page 594). On July 15 I set out with Diggity and the camels for the other side of the Gunbarrel.

Diggity was superb, a perfect and loving friend. She was a ball of muscle, covering 50 miles a day scampering back and forth. She had an unfailing sense of direction, always led me back to camp after an evening stroll, and excelled at chasing away creatures like centipedes and snakes.

The country was harsh, though lovely in its way. Sandhills stretched over some of the route, interspersed here and there with great stands of lacy but impenetrable mulga bush. Golden tufts of spinifex grass turned portions of the trail into a giant pincushion that continually jabbed at our feet. The camels strained under loads consisting largely of water, and noselines frequently snapped. Progress was achingly slow.

Yet there were some moments along the Gunbarrel that I will never forget. One morning before sunrise—gray silk sky, Venus aloft—I saw a single crow, carving up wind currents above the hills.

One evening I opened a tin of cherries, the ultimate luxury, ate half, and put the other half beside the swag for breakfast. Woke up the next morning: Bub's great ugly head, asleep on my legs, suspicious crimson stains on his lips. Good-bye breakfast.

DAY 112 Two weeks and 220 miles into the Gunbarrel, I had a wham-bammer of a day. It began like most others, except there were clouds. Rain, I thought as the first light slithered under my eyelids and into the folds of the blankets. But the clouds vanished, and then I realized something was missing: the sound of familiar camel bells!

Zeleika and Bub were gone, and Dookie, it developed, was only around because he had a great hole in his foot and couldn't walk. Where were Zeleika and Bub? How far had they gone? What about Dookie?

Then I recalled what a very wise friend in Alice once said to me, "When things go wrong on the track, rather than panic, boil the billy, sit down, and think clearly."

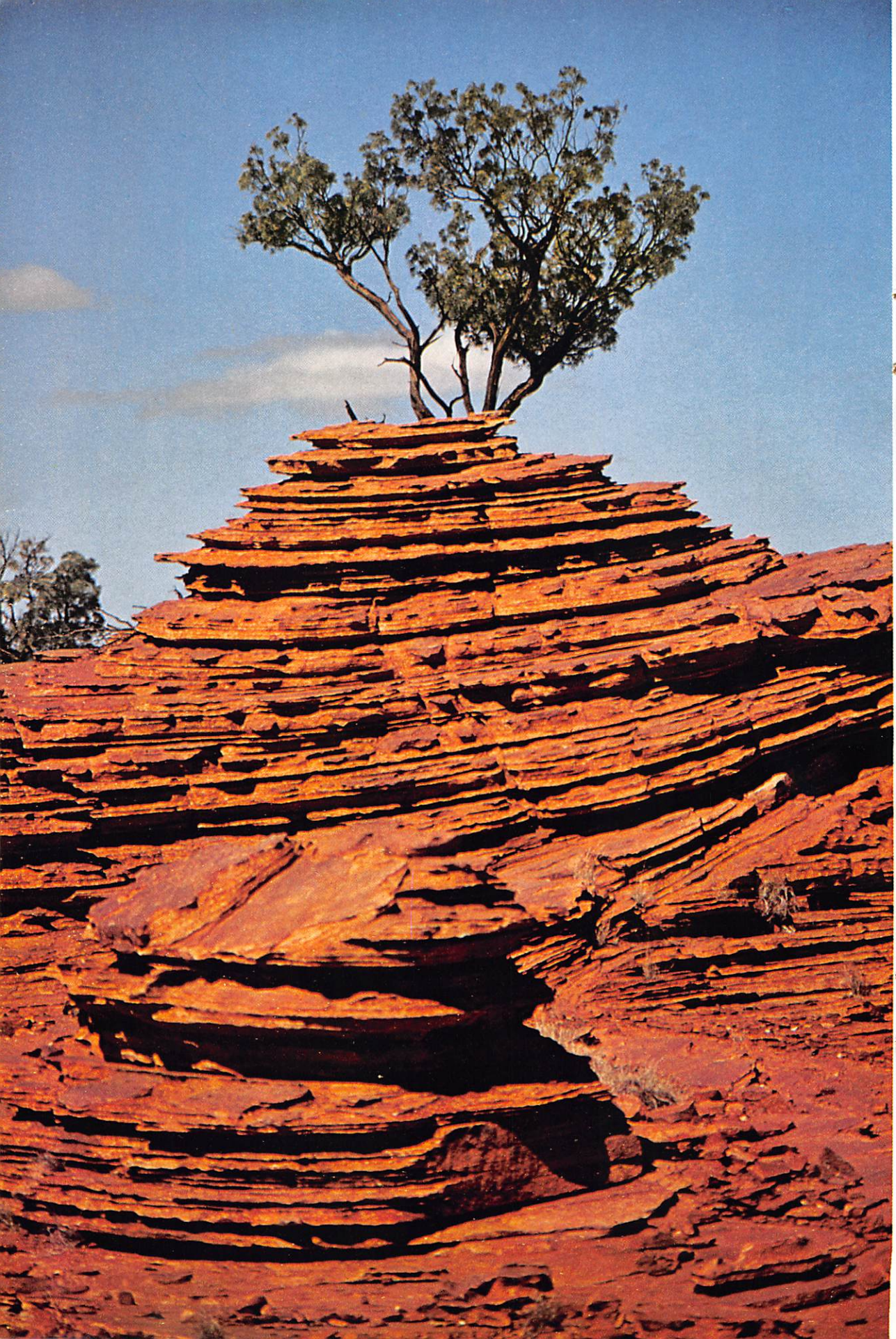
So I boiled the billy, sat down with Diggity, and went over the salient points:

- You are a hundred miles from anything.
- You have lost two camels.
- One of the other camels has a hole in his foot so big you could sleep in it.
- You have only enough water to last for six days.
- My hip is sore from walking.
- This is a god-awful place to spend the rest of your life.

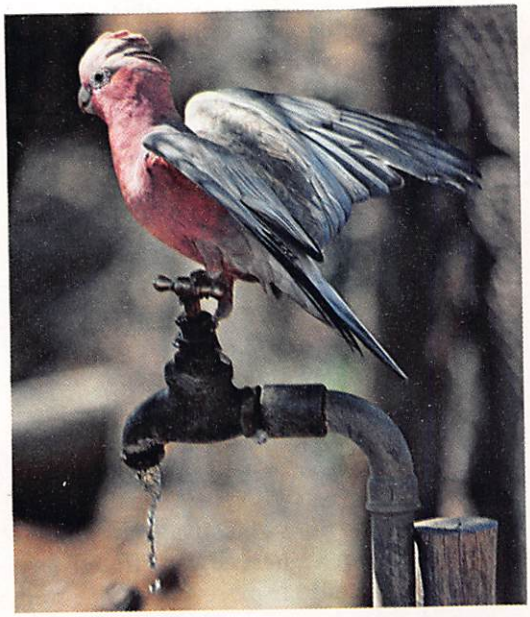
So, having tidied all that up, I panicked. Fortunately, it didn't last, and after four hours I finally (*Continued on page 606*)

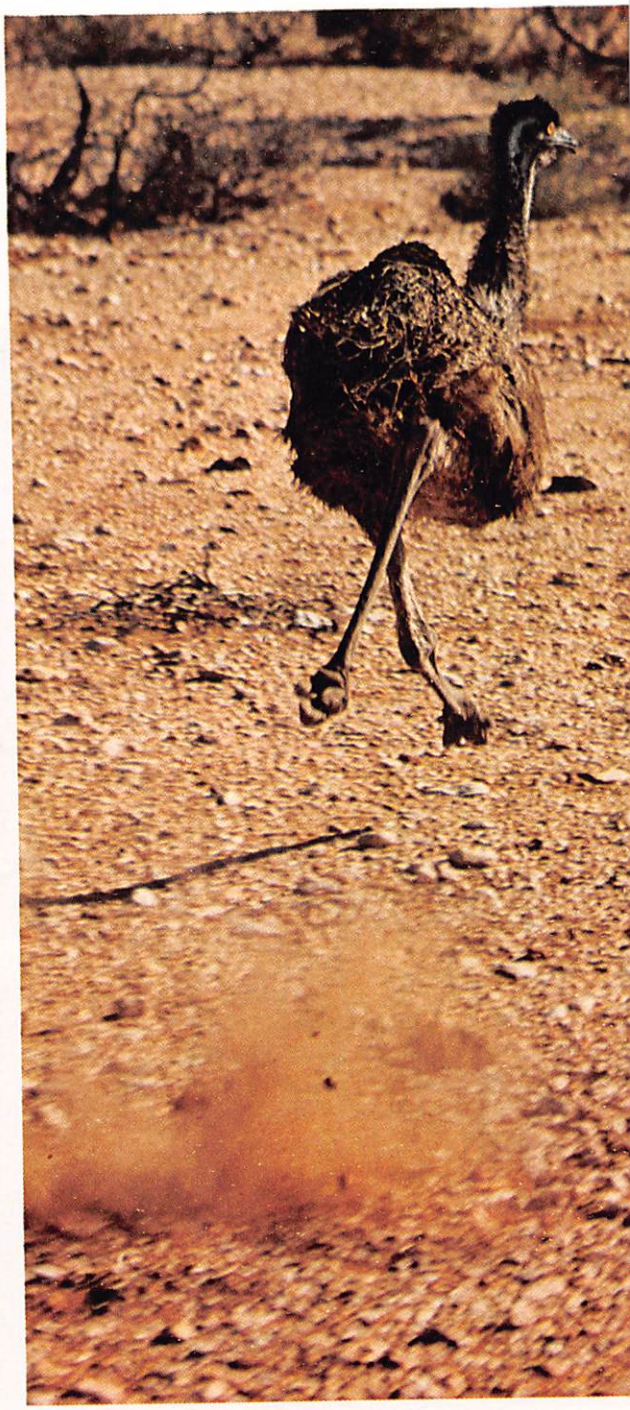
A most curious creature, Bub cracked me up with his nosy antics. Not even a car's front seat was out-of-bounds (**top right**). Many tourists I met along the way did not suffer from shyness either. Up they'd come in cars to snap some pictures, pester me with questions, or, like these fellows (**right**), stand around drinking and laughing.

Alone Across the Outback



Just when the desert seemed endless, I would come upon a fantastic sight, such as this rock formation at Pine Ridge (**left**). It lies along the Canning Stock Route, a former cattle trail across brutal country from Halls Creek to Wiluna. Nearby I found a well, and everything was lovely—until Diggity took poisoned dingo bait, and I had to shoot her.





Any trick will do when you are trying to survive in arid western Australia. I watched a funny galah cockatoo turn on a faucet and drink from it (**top left** and **left**). My favorite animal along the path was the emu (**above**), an ostrichlike bird that can scoot along at 30 miles an hour.

managed to get Zeleika and Bub back, doctored Dookie's foot as best I could, and set off once more along the Gunbarrel. The water situation was saved shortly afterward by the arrival of Glendle and his truck.

When he caught up with us, he was so exhausted from the trip he could barely speak. We unloaded two of three 40-gallon water drums from the truck, then filled my own drums from them with gallons to spare.

"You'll be wanting the other drum down the trail a bit," Glendle said. Wearily we drove some 50 miles to the west, dropped off the drum, and returned to camp. Minutes later Glendle was dead asleep in his blanket.

Next morning Glendle headed back toward Pipalyatjara. When he had become only a dust cloud on the horizon behind us, the silence and solitude closed in again.

I was not in the best of shape. My left hip, sore from endless slogging over sandhills, was barely usable. My skin was dry as dog biscuits, my lips were cracked, I'd run out of toilet paper, and a sun blister was trying to take over my nose. What, I wondered, do you do at a party when your nose drops off into your beer? At times I was so scared of dying that the knocking of my knees woke me up in the morning.

Had it all been worth it? I still thought so.

DAY 118 At the cattle station called Carnegie, at the end of the Gunbarrel, I received another blow: The station was little used because of severe drought, and I could not resupply with food as I had planned. There was nothing to do but trek northwest 75 miles to the station at Glenayle and hope for the best. Food ran so low that I once shared Diggity's dog biscuits—not exactly a banquet, but if they could keep her going, they could do the same for me.

By great luck I met two men traveling by car to Carnegie, and they gave me some tucker. One of them kindly made a leather boot for Dookie's sore foot. It didn't last long, so I made another one that lasted even less time. All I could think of was Glenayle and escape from the drought.

We straggled in at last, a miserable sight. I hadn't washed for a month, my face and clothes were covered with red dust, I was exhausted, and I looked like a scarecrow. As I entered the Glenayle homestead, the first thing I saw was a lovely, middle-aged lady watering her flower garden. As I approached her, she smiled and without a lift of the eyebrows said, "How nice to see you, dear. Won't you come in for a cup of tea?"

And so I met the Ward family—Eileen, her husband, Henry, and their sons, Rex and Lou. They would not hear of my pushing on for at least a week and insisted I stay with them. What warm, generous, and utterly charming people, and how little I can ever repay their kindness.

That week gave me a memorable look at western Australia's disastrous years-long drought. Though situated on the edge of the desert, the Wards' cattle station survives on occasional rain and on groundwater from wells. But as we toured the property, I saw what devastation the drought had worked (right). The horses were skin and bones and the cattle were even worse. Some of the animals died of exhaustion and hunger before our eyes.

Yet never once did I hear a complaint or a harsh word from the Wards. Their entire future was at stake, with no relief in sight. Still, they hung on with courage and hope.

While the horses and cows suffered, my camels—who could browse on trees as well as on ground cover—fared better, and after a week were slightly improved. One morning as I stood talking with Henry and patting Bub, big, jealous Dookie came up behind me. By way of attracting my attention, he opened his great jaws, took my entire head between them, and squeezed gently. Then he opened his mouth and galloped off, immensely pleased with himself.

I don't allow bad manners among my camels, but this once I could only laugh at Dookie's particular form of wit.

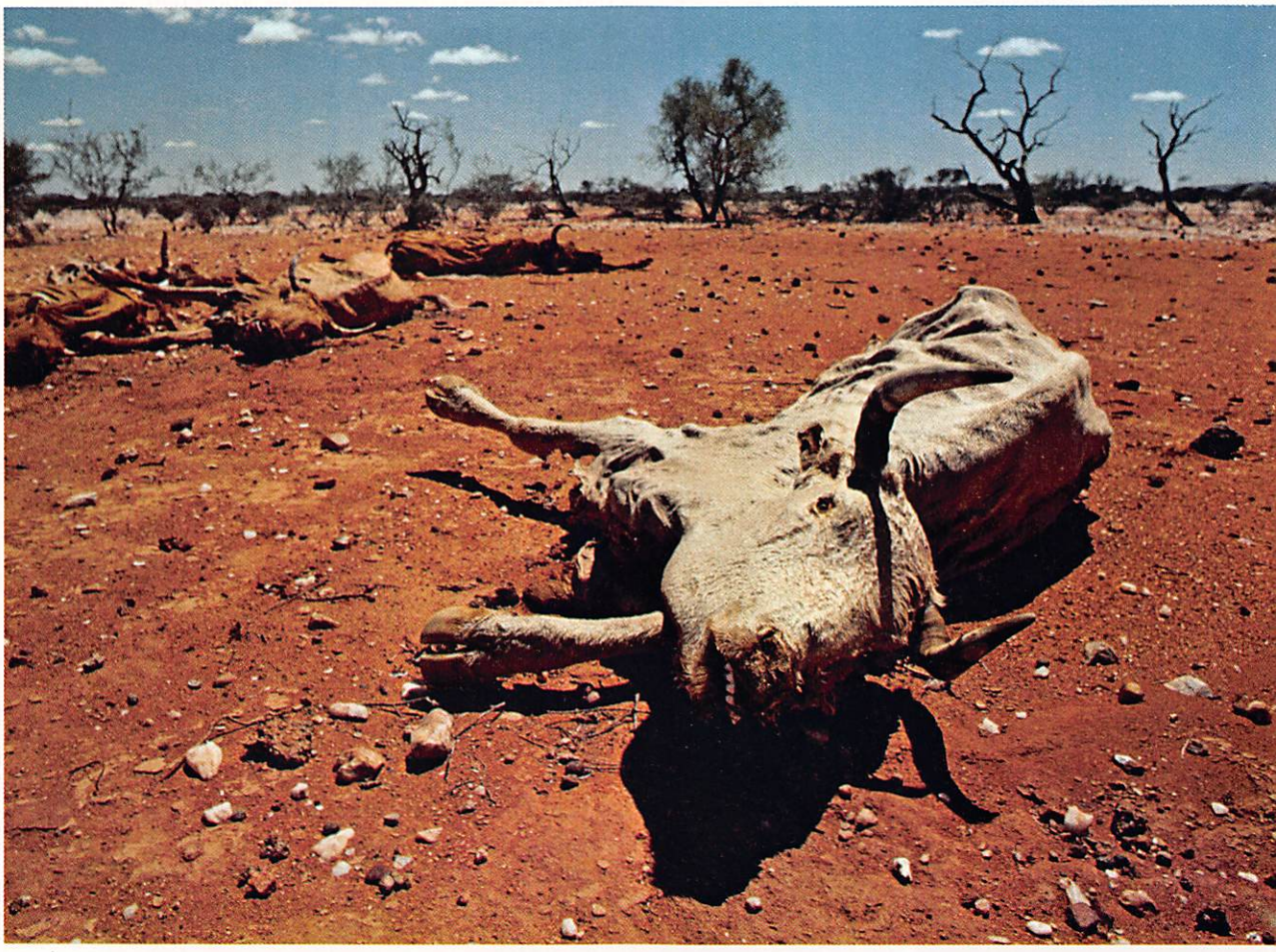
Soon afterward we began packing up to leave Glenayle. The camels seemed pleased to get into their traveling kit again, so I didn't tell them what lay ahead of us: The Canning Stock Route.

The Canning is an Australian legend. It runs nearly 1,000 miles, linking the small towns of Halls Creek and Wiluna and, far north of our route, crossing the Great Sandy Desert, one of Australia's worst. The route got its name from the days when cattle were driven along it from well to remote well, though I don't see how they survived.

Fortunately, I had to cover only the most hospitable section of the Canning—170 miles, from a point near Glenayle to Cunyu. There the Gibson Desert would be far behind us, and the remaining 450 miles to the Indian Ocean would be much easier.

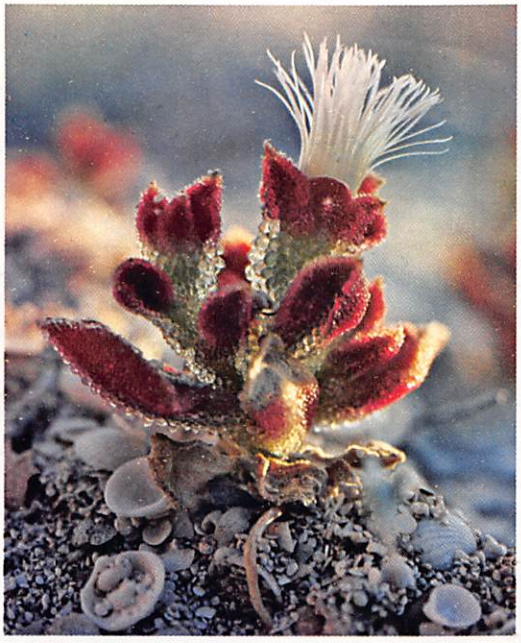
DAY 129 We left Glenayle after a week and headed for the Canning at Well Number 9. This was dingo country, and I was terrified that Diggity would pick up one of the poisoned baits set out to exterminate the wild dogs. I put a muzzle on her, but she whined and scratched at it and was so disconsolate that I finally took it off.

The area was rougher than anything we had crossed before, and at Well Number 6 I called a halt. The setting was lovely, an infinitely extended bowl of pastel blue haze carpeting the desert, with crescent-shaped hills floating in the bowl and fire-colored sand dunes lapping at their feet. In the far distance five violet, magical mountains soared above the desert. Have you ever heard mountains roar and beckon? These did, like a giant lion—a phantom sound meant only for the ears of madmen and deaf mutes. From the pit of my stomach I longed to journey to those mountains. I had found the heart of the world.



Scenes of death and dying haunted me every day I spent in the cattle country west of Carnegie, where a merciless three-year drought had laid waste the land. Dead cows littered dusty fields, and those animals still hanging on to life looked like skeletons. Frequently I saw cows trying to live off dead sticks. One night I was reduced to feeding on dog biscuits. The camels had it worse: Their staple of trees and bushes had all but disappeared. Without the rescuing kindness of cattle-station families along the way, I wonder if my camels and I could have outlasted this ravaged region.

We couldn't believe it. The camels' eyes grew wider and wider as we stood on a beach (**facing page**) and looked out over the Indian Ocean. Even the animals sensed that our six-month odyssey had ended. We played for a week at Hamelin Pool before I left for home. While the camels learned that they could not drink salt water, I found exquisite glasslike flowers (**below**) and fished from a platform of stromatolites (**bottom**)—fossils formed from algae. Time never passed so sweetly, so sadly.



Well Number 6 hardly deserved the name. The surface of the water lay nine feet below ground level and could only be reached with a bucket, a rope, and enough effort to cause a hernia. The water tasted foul, but none of us cared, and I camouflaged mine with huge doses of coffee.

The night was incredibly lovely. I made camp in a cathedral of 50-foot silver ghost gums bordering the well, and built a mattress of fallen leaves that scattered golden jangles of firelight in a million directions.

The camels had more forage than they could possibly eat. In the evening they rolled and played in the white dust, raising puffs of cloud that the fat red sun turned to bronze. For three days it was perfection, and I wanted never to leave. All the good things of the journey seemed to crystallize in this one place, and I felt somehow untouchable.

On the third night Diggity took a dingo bait. I had to shoot her. Before dawn I left that place I had thought so beautiful.

DAY 137 My only thought now was to push on to the end of my route. The country passed unnoticed beneath my feet, and I recall little of that time. I think I reached Cunyu on August 27.

There at last the press caught up with me, and I first learned of interest in "the camel lady." To avoid pestering questions, I left the camels at Cunyu and sneaked away to Wiluna, 40 miles to the south. The people of Wiluna asked no questions: They simply took me in and cared for me. Within a week I was setting out for the Indian Ocean coast.

Behind me lay nearly 1,300 miles—five months of travel. Ahead lay only 450 more miles. We made them slowly, for beyond Cunyu Zeleika fell seriously ill. She had nursed Goliath, her calf, throughout the entire six months, and now she suddenly began bleeding internally. I dosed her with everything in my medicine kit, but I was afraid she wouldn't make it. I was wrong.

DAY 180 A month after leaving Cunyu we arrived at Dalgety Downs cattle station, only 156 miles from the sea.

David and Margot Steadman, homesteaders at Dalgety, took us in and proceeded to spoil all five of us. The camels were fed barley, oats, and lollies, an undreamed-of

How do you say farewell to camels that have crossed a desert with you? I found no right way except to take them for one last swim in the ocean before leaving them with

diet. They were praised, patted, stroked, and talked to. With such care even Zeleika began to improve. To help matters along, I tried to wean Goliath from her by putting the two of them in neighboring yards with a fence between. But clever Zeleika, sick as she was, always managed to maneuver her udder within Goliath's eager reach.

For a time I considered leaving Zeleika behind with Dave and Margot and pushing on to the sea with the other three camels. But she continued to improve, and I decided that a dip in the Indian Ocean might do the old girl a power of good.

On that final stretch of 156 miles we rode in style for about 30 of them. At Woodleigh, 36 miles from the coast, two kindly homesteaders, David and Jan Thomson, offered to transport the camels and me on their flatbed truck to a point only a couple of hours' walk from the beach.

I accepted, but the camels had reservations. After the long journey, however, their trust in me was complete, and they finally climbed aboard. Up they went at last—Dookie first, bravely, then Bub, who would follow Dookie's rear end through hell if necessary. Then wise, stubborn Zelly and finally Goliath, that gregarious little pest, who wasn't about to see his milk supply carted off. We trussed them up like plucked chickens, and off we headed.

DAY 195 Six miles short of our goal we unloaded and set out on the final leg. Oh, how my spirits soared! Two hours later I saw it, glinting on the far side of the dunes—the Indian Ocean, end of trail.

An anticlimax? Never. We rode down to the beach toward sunset and stood thunderstruck at the beauty of the sea. The camels simply couldn't comprehend so much water.

gentle friends. For a second I was tempted to saddle the camels and start over. But no. The trip is not meant to be repeated except in my memory—over and over again.

They would stare at it, walk a few paces, then turn and stare again. Dookie pretended he wasn't scared, but his eyes were popping out and his ears were so erect they pulled his eyelashes back.

I was riding Bub, and when the surf sent globs of foam tumbling over his feet, he danced and bucked and shied and nearly sent me flying. Zeleika would have nothing to do with that freakish ocean, but the others were entranced. They refused to believe it wasn't drinkable. I mean, if it's water, you can drink it, right? Each time they took a mouthful, their expressions broke me up.

We stayed one glorious week, then it was time to go. I had decided to leave all four camels in the care of David and Jan Thomson, who loved them dearly and who would give them a perfect home at Woodleigh after I returned to my own home on Australia's east coast, where I could not keep them. On October 27 David and Jan showed up in the truck, and we turned from the beach for the last time.

Dear camels, may you spend your dotage being fed lollies, facing Mecca, and contemplating the growth of your humps.

MANY TIMES since the trek I have been asked why I made it, and I answer that the trip speaks for itself. But for those who persist I would add these few thoughts. I love the desert and its incomparable sense of space. I enjoy being with Aborigines and learning from them. I like the freedom inherent in being on my own, and I like the growth and learning processes that develop from taking chances.

And obviously, camels are the best means of getting across deserts. Obvious. Self-explanatory. Simple. What's all the fuss about? □

MEXICO

"A very beautiful challenge"

By MIKE EDWARDS
SENIOR EDITORIAL STAFF

Photographs by THOMAS NEBBIA

GUILLERMO ALDANA E.

ABOVE THE ARID TABLELANDS of Chihuahua State in northern Mexico the scudding clouds and whistling wind speak of rain. The language is reassuring to campesinos. Watching them plow, I am reminded that this tableau is old, very old: brown men opening orange earth to plant corn and beans, the sustenance of great civilizations in Mexico a thousand and more years past.

But the classic tableau has one flaw: This earth does not belong to the plowmen. Rancho El Águila—Eagle Ranch—has been invaded by its have-not neighbors.

I try to talk to Luis, a narrow man who at midday has stopped plowing to boil beans in a pot and coffee in a can. Is it right, I ask, to take what someone else possesses?

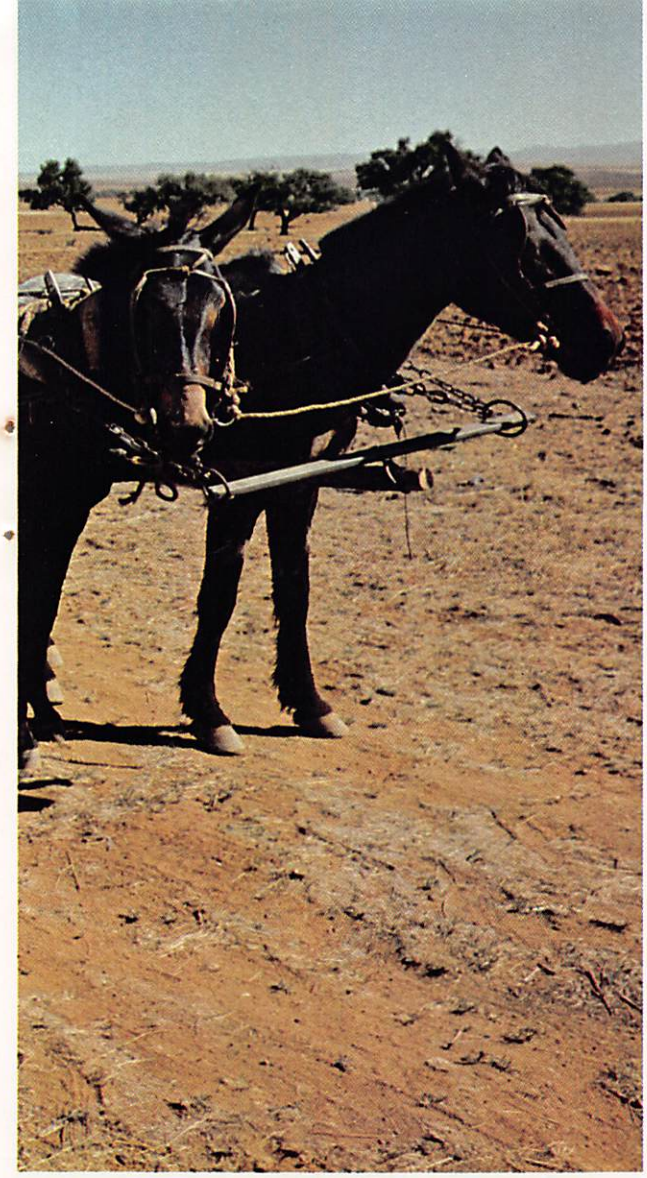
He grins briefly, flashing white teeth. "When you have none yourself," he answers. His dark eyes return to the fire, as if there is no more to be said.

Much more might be said about the Mexican peasant's yearning for land, inspired by more than simple need. "Land and liberty!" was a cry of the Revolution, that bloody and chaotic *(Continued on page 617)*

Balloons brighten a street in Mexico City, capital of a nation whose faltering economy now shows signs of getting back into gear. Beetles, Rabbits, and other Volkswagens move along the assembly line (right) at Puebla, site of the second largest VW plant in Latin America.

"Smoking Mountain," Popocatépetl is wreathed by clouds that hide an occasional outburst of volcanic gases—"something of a miracle" to Hernán Cortés. The Spanish

conqueror ravaged Cholula, the holy city of the Cholulteca Indians, where the colonial Church of Our Lady of the Remedies rises atop the ruins of the Cholulteca pyramid.



Hungry for land, angry peasants last year invaded a cattle ranch in the State of Chihuahua. Manager Jesús Clavé, carrying a rifle for protection, asked them to leave (above). He also met with a defiant group (left) that had seized a watering pond.

In the past, such confrontations were frequent under a land-reform program that redistributed large parcels of privately owned land to campesinos. Facing an urgent need to raise food production, the government discourages squatters and invites small farmers to band together for greater production.

(Continued from page 612) decade, 1910 to 1920, which launched modern Mexico. The campesino has not forgotten. Nor can he; the oft-stated vow of every Mexican president is to continue the Revolution—with measures to eradicate want and helplessness.

Recently in Mexico a dozen or more land invasions have taken place each year (left). Sometimes the invaders win the government's support. Sometimes the owner gives up part of his land to avoid further trouble. It is part of the rural scene—the Revolution at work, in a peculiar way.

The Revolution has also worked in orthodox ways. Since the 1930's the government has redistributed more than 200 million acres, probably a record among agrarian-reform campaigns in Latin America.

But the land often was handed out in small parcels, a few acres to a family, to stretch this largess for the good of the greatest number. As sons grew to manhood on these postage-stamp plots, they had to look elsewhere for a living, with the result that today several million rural men are landless.

Mexico cannot hope to answer the needs of so many in the years ahead, a rural development expert told me. He added soberly, "Our cities will become much bigger, and there still will be Mexicans in Texas."

Riches Yet to Be Tapped

So it is a Mexico still troubled by want that I explored recently. But I also found enormous progress, and the potential for more abrim in the nation's resources, which include coastal fisheries, timber, iron, copper, silver, gold, and the new gold, oil.

Did I say *the* nation? There are "many Mexicos," as Lesley Simpson has written in a book by that title. The thirsty north, divided by the Sierra Madre ranges, Oriental and Occidental, is distant in measurements other than kilometers from the lush southeast (map, pages 620-21). And these regions seem far from Mexico City, throbbing and sprawling under its mantle of smog.

Ancient tongues rattle in the countryside. Nahuatl, Maya, Zapotec, and scores more survive in spite of probing new highways. Indian blood flows in the veins of at least 90 percent of Mexico's people, and many hold to Indian ways—which accounts for great

riches in folk art (see article, pages 648-69).

It also is a more *Yanqui*-fied nation than when I last visited, a dozen years ago. One Sunday in Mexico City I went with my guide, Alberto Coria, into a café where a game of *fútbol*—soccer—flickered on a television screen. "Do you like soccer?" I asked.

"I like *your* football better," Alberto said, and then he commented on the loquacity of Howard Cosell, who arrives by cable TV.

A Revolution Wrought by Growth

For three decades Mexico has been a glamorous performer among developing nations. Gross production rose an average 6 percent a year. Automobile assembly lines boomed, rising to 350,000 units annually. Mexico invested in health services and education. She created an urban middle class, and at the top she made entrepreneurs rich.

A fitting symbol of Mexico today, I think, is a man I saw in the cavernous market at Toluca, an hour's drive from Mexico City. By his dark, angular face I would bet that none save Indians were his ancestors. But his sombrero was a hard hat.

I combed palm-fringed beaches and wandered antique cities. San Miguel de Allende, Taxco, Morelia, cities of cobbles and spires, recall the Spanish colonial era that ended in 1821. Tourists and expatriates have discovered these; I remember stopping in a café in San Miguel that trembled unnaturally to songs from *Oklahoma!* and *The King and I* as U. S. residents practiced for a revue.

But Mexico endures. When the tourist buses have snorted out of Taxco and the silver shops have closed, local folk stroll to the *zócalo,* the shady square in front of the pink-stone church, to sit, to talk, just to be at ease. It is a gentle time. Gringos can learn more than Spanish in Mexico.

This is a youthful nation (half the population is under the age of 17), and two young people symbolize for me the nation's hopes as well as her problems.

I met 17-year-old Jesús Rodríguez on the Pacific coast, in Michoacán State. Perched in a glass cubicle in a building nearly half a mile long, he flipped switches while watching a TV monitor. Below, machines squeezed steel bars into red-hot wire.

A few years ago a government company called SICARTSA invested three-quarters of a

Fervor and fight once marked the lives of Zapatistas of Cuautla, like these

veterans who followed Emiliano Zapata during the blood-red years of the Revolution six decades ago. Crying "Land and liberty!" they plundered the rich and gave land to the poor.

billion dollars to build a steelworks here. Where a relative handful of fishermen and coconut harvesters dwelt, the instant city of Lázaro Cárdenas rises, alive with 60,000 people and boomtown social ills.

SICARTSA hoped to continue building this plant through the 1990's to make it the biggest steel mill in Latin America, producing ten million tons a year. Financial problems have delayed the grand plans, but for Jesús, son of a seller of fruit, SICARTSA already is a success. In his first job he has entered a world of machines and electronics.

I met Juana in the southern forest of Chiapas. She wore a long blue skirt with bands of red and yellow—colors of her community of the Tzeltal, one of several Indian groups in this region. In her village stood a school of rough boards with signs over its two doors: *primer grado, segundo grado*. "Next year we will have a third," said Agustín Gómez López, who is half the faculty.

At nine o'clock he blew a whistle. Seventy youngsters formed up, boys in one line, girls in another. As the tallest, Juana led the girls while Agustín barked marching commands.

MEXICO

To describe Mexico, Cortés reportedly crumpled a piece of paper—illustrating the mountains that mantle two-thirds of the land. Revolution ended Spanish rule in 1821. Nearly a century later, another revolution ousted a dictator, giving birth to modern Mexico. After decades of progress, economic crisis swept the country in the mid-1970's, fueled by government spending for rapid development and aggravated by worldwide inflation and finally by devaluation of the peso. A new government has reduced spending and seeks to increase production to meet the needs of an exploding population that threatens to double by the year 2000. Vast reserves of recently discovered oil and natural gas promise long-range economic support.

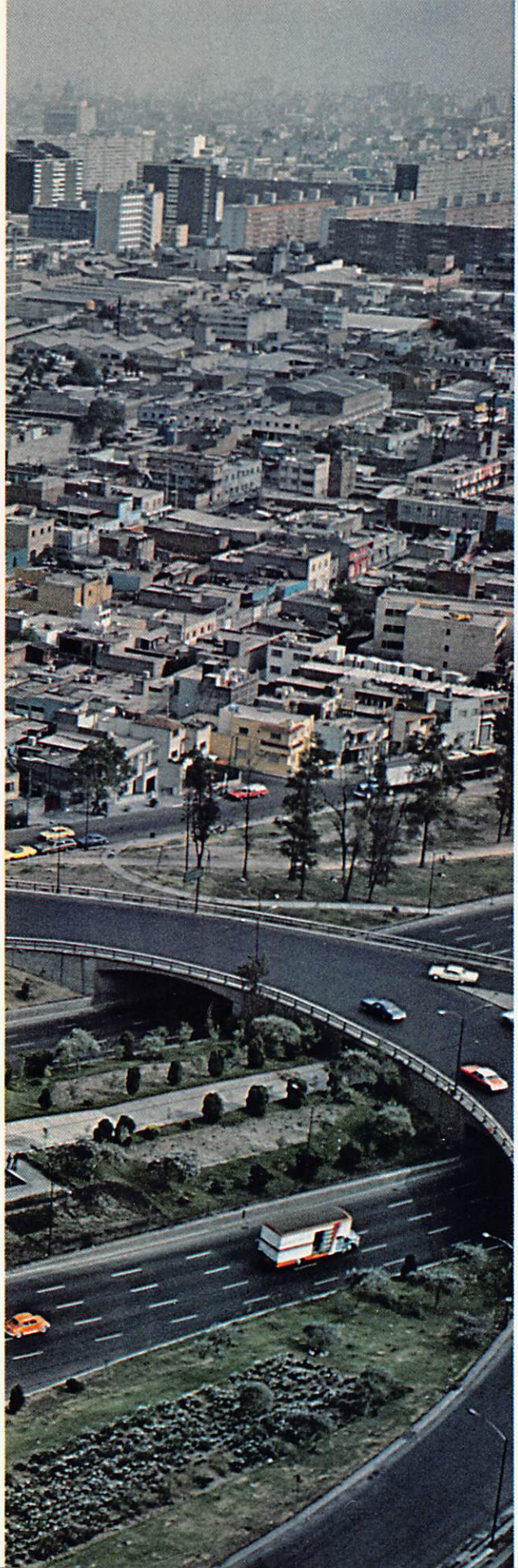
GOV'T: Republic. **AREA:** 1,972,539 sq. kilometers (761,601 sq. miles). **POPULATION:** 64,000,000 (est.). **LANGUAGE:** Spanish and many Indian languages. **RELIGION:** Predominantly Roman Catholic. **ECONOMY:** Grows 50% of world's sisal. Corn, sorghum, coffee, wheat, beans, sugar, rice, and livestock. Rich in minerals. Works deposits of petroleum, silver, sulfur, copper, lead, iron. Tourism. **MAJOR CITIES:** Mexico City (pop. 8,628,024), capital; Guadalajara (pop. 1,640,902); Monterrey (pop. 1,090,226).

I watched her march—*¡uno, dos! ¡uno, dos!*—erect, eyes ahead, as if this before-school exercise were as important as anything in her world.

Juana is 14 years old. In the natural order of things she will soon marry, and perhaps nurse children without embarrassment as she goes about the village. Or she may seek urban adventure. She is partly prepared, having learned elementary Spanish.

Whether there will be a job for Juana is another matter. Mexico's population has been growing by 3.5 percent a year, and at that rate will double in about twenty years. At 64 million, she has far outdistanced every Latin American nation save Brazil.

In spite of industrial growth there always has been high unemployment in Mexico—and underemployment, in the form of migrant vegetable pickers and men who earn half a living keeping protective eyes on parked cars in the cities. To accommodate young job seekers—not to mention campesinos streaming into the cities—Mexico must create 700,000 new jobs every year. Her best record is far short of that.



I remember looking at Mexico early one June morning from without—from the U. S. side of the border at El Paso, Texas. Flowing in a concreted channel, the Rio Grande was a mere captured creek, 20 yards across, waist-deep. Scores of Mexicans were wading or waiting to. My Border Patrol companion, Ray Russell, got out of his cruiser and shooed them back; to arrest so many would be impossible. His radio crackled with reports of aliens who had penetrated the Border Patrol's thin defenses.

Several women waded across. One wore a dressing gown, beneath which she modestly put on her dry clothes. A man of about 60 also came. Ray sent them all back. Two hours later I saw the man again—in Border Patrol custody. Why was he so determined to get to the United States? "There are no jobs in Juárez," he said.

Inflation Cripples a President's Gains

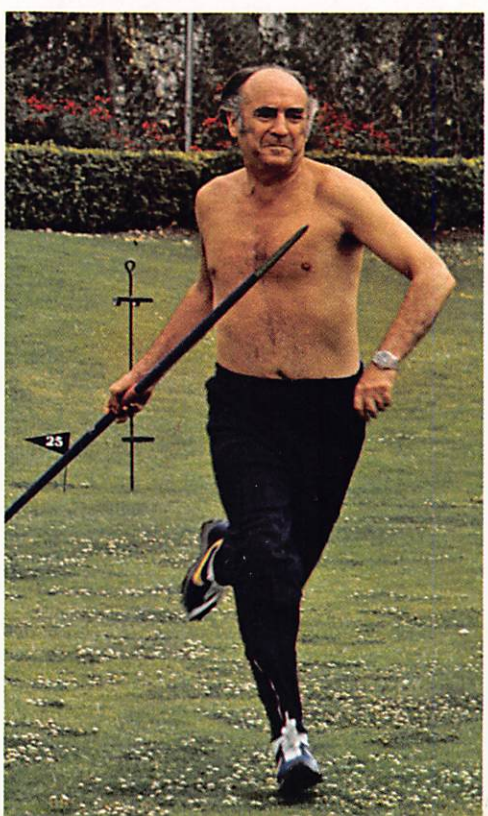
Trying to create jobs and get money into the hands of people at the bottom of the ladder, President Luis Echeverría, who took office in 1970, plunged the government into ambitious development schemes, such as SICARTSA, while paying peasants to build roads with picks and shovels. Though laudable, the massive effort, combined with global recession and inflation, brought economic progress to a virtual halt.

Needing funds, the government increased the money supply—by 30 percent in a single year—while running up a foreign debt of 20 billion dollars. Inflation galloped along, reaching 30 percent in 1976. Industrialists, previously the main source of job-creating capital, began to worry. Slowly, then in a flood, almost 4 billion dollars was sent out of the country. "You'll find it invested in such things as condominiums in Colorado," an American official said.

On a rare virtually smogless day, a view of Mexico City extends from the Monument of the Race, honoring the nation's Indian peoples, to a high-rise apartment complex on the site of the Aztec market town of Tlatelolco. With a population estimated at almost 12 million, the greater city may now be the world's largest.

Taking the helm of Mexico's ship of state, President José López Portillo—shown with his family at their official residence in Mexico City—found its economic engines laboring under both inflation and unemployment. Foreign debt stood at 20 billion dollars. Wary businessmen invested their capital abroad.

"A very beautiful challenge," observed the former professor and athlete, who keeps in trim by throwing the javelin (right) and running a mile a day. After a year and a half of López Portillo's tough economic policy, inflation has slowed and the peso has regained strength.



Before leaving office in 1976, Echeverría bowed to pressure and devalued the peso, which had held steady at 12.5 to the dollar since 1954. It plunged by almost half. "Crisis" became an everyday word in the speeches of José López Portillo, who succeeded Echeverría and began sorting through the economy's shattered pieces.

Era of the Technician Dawns

I talked about the situation with Francisco Javier Alejo López, a young economist who had taken charge of Ciudad Sahagún, a government-dominated complex that manufactures railroad cars, trucks, buses, and Renault automobiles. Curly hair and mustache gave him a faintly Chaplinesque visage, but his words dispelled any suggestion of comedy.

"An era has finished," he said. "You might call it the era of easy development, as you had in the States in the 19th century, when there was a lot of land and growing markets."

He foresaw a difficult time ahead. "It will require organization, efficiency, a different constellation in government—not the traditional politician, but technicians. Honest men," he added thoughtfully.

It was nine at night when I entered his office and ten when I departed. Two other callers waited. Such is the life of the new government technician.

Businessman Salvador Domínguez Reynoso also knows about long hours. At age 14 he was a bank's office boy. He studied accounting at night, and today he operates companies trading in fertilizer, textiles, and real estate. Despite the difficulties, he is optimistic, as were other executives I met. "We are going to solve our problems," he said. "I don't want to say tomorrow or next month. But ten years from now Mexico will be quite different."

Oil Lights Up the Future

One reason for optimism is apparent in and around the city of Villahermosa, on the steamy Gulf side of the Mexican south.

At an intersection a bronze statue of a man rises, his face somber, consumed in meditation. "Tata Lázaro," peasants called him: Daddy Lázaro. Lázaro Cárdenas, as president from 1934 to 1940, earned their love by giving them land, almost 45 million acres, the first real effort at agrarian reform.

It is Cárdenas's other famous act that his statue contemplates from Villahermosa. Trucks laden with drilling rigs rumble past. New hotels cater to visitors, who range from drawling pump salesmen from Texas to Chinese geologists. Twenty-five kilometers from the city the sky is never dark now; it knows a perpetual sunset glow from surplus natural gas burning in what may be the richest petroleum fields in this hemisphere.

Cárdenas expropriated the petroleum industry in 1938. American and British oil companies got 129 million dollars; Mexico got control of a resource now reckoned in bonanza proportions. At the end of 1977 the proven reserves were officially estimated by the government at 14.6 billion barrels. But oilmen speculate that potential reserves may be as great as 120 billion barrels, 12 times the proven reserves of Alaska's North Slope. Much of the oil is being found in the now developing Reforma fields near Villahermosa, in the States of Tabasco and Chiapas. Moreover, the Reforma fields are bloated with natural gas.

PEMEX Computes Size of a Bonanza

In Mexico City other figures dance across the desks of officials of Petróleos Mexicanos, the government oil monopoly known as PEMEX: 21 billion dollars to be earned in foreign exchange between now and 1982; billions for expansion of refineries and the already well-developed petrochemical industry; billions for pipelines.

Mexico must borrow to finance expansion, and the petroleum and petrochemical industries, largely automated, will not greatly increase permanent employment. Still, construction jobs will put pesos in thousands of pockets, and eventually the government budget will grow by billions.

On the tower of a Reforma well called Platanal 71—Banana Plantation 71—I met Manuel Colón Romano, muscular and proud. "I can do any job on this rig," he said. "I learned everything on the job." He expected to work 120 days at Platanal 71, long enough to drill three miles down. PEMEX is sure to have another job for him after that.

The town of Reforma counted 400 souls in 1960. Now it is home to several thousand. At

night the glow of a gas flare bathes the new municipal building and new PEMEX employee houses in eerie red. By day a hammock salesman does a brisk business. From a small shop a man sells chickens; he came to Reforma because "it looked like a good place to make money." Across the street the inevitable shoeshine boy polishes the boots of a lanky man in stovepipe jeans whose face surely was wrenched from a Maya temple.

I stopped in a radio repair shop. Its proprietor, too, had sensed a good thing and came from afar. But his customers complain, he said. "I fix their radios and then they stop working again. They think I am to blame. Here is the trouble." He opened a set and showed me terminals blackened by sulfur fumes from the gas flare.

Abundant rain and torrid sun help to make life a bit easier in this region. I have never seen a market groan as Villahermosa's does on Sunday, market day, under its piles of watermelons, papayas, mangoes, bananas, cocoa beans, onions, and chili peppers. An army of buyers haggles furiously with an army of salesmen.

I watched a girl of about 8 with black button eyes who was leading a hawk-nosed man of about 45. Clutching his right hand, she picked their route through the jammed aisles. His other hand held two eggs. Where were they going with two eggs?

Splashing through a bed of water hyacinths near Villahermosa, cattle now

This way and that she led, until they arrived at a drink stand. I saw the man lean over the counter, speak to the waitress, then surrender the eggs. She broke them into a blender, added milk, ice cream, and vanilla flavoring, spun the mixture vigorously, then poured frothy liquid into two tall glasses. Father and daughter laughed as they savored their rich Sunday treat.

Machetes Against a Maya Jungle

Southeast from Villahermosa a much-traveled road leads to the lovely Maya ruins at Palenque. Continuing west, the road seems to be walled in by green growth.

A frontier quality survives in this lush part of Chiapas State. You see signs of outside influence, of course—signs on the little thatch-roofed *tiendas* that say "Coca-Cola" and "Fanta" and "Pepsi."

But observe the men who are out at daybreak: muscular, short, built like bronze bedsprings. All carry the tool of the forest, a machete. That this plain blade can do a bulldozer's work in bringing the jungle to heel seems incredible. But it can, with the aid of a match. As day brightens, the hills turn gray with the smoke of dried vegetation consumed in the old slash-and-burn way, making room for corn and beans and bananas.

In the office of Alejandro Canelos in the northwestern city of Culiacán, eight

compete for space on the range with an increasing number of oil rigs.

wooden boxes along a wall contained tomatoes of various varieties and ripeness. Between calls on his three phones, Alejandro—"Alex"—selected one.

"That's a good tomato for you," he said comfortably in English. "Firm, vine ripened. You want to taste it? You *should* taste it." He cut it in two. "I picked that four or five days ago. It's holding up *good.*"

Vegetables for Winterbound Yanquis

Beside Culiacán lies a flat expanse of irrigated land, one of the most blessed areas in the country. The vegetable farmers of Sinaloa State and neighboring Sonora not only provide vegetables for Mexico but also grow 60 percent of the tomatoes and 80 percent of the cucumbers that reach U. S. tables in winter. Trucks deliver Canelos tomatoes to Boston in five days.

The Canelos farm covers about 3,500 irrigated acres, about half of it rented. The rest is owned in the individual names of seven persons—brothers and other relatives. This is not unusual in Mexico, for the agrarian-reform law forbids a person to possess more than a hundred hectares (247 acres) of irrigated land or more than two hundred hectares of nonirrigated crop land. "We are within the law," Alex insisted. "You can't tell the difference between the properties, but on paper they are separate. We farm separately, we pay taxes separately."

The Canelos operation is smaller now than in 1976, when the government took 450 hectares for distribution to landless families. Worth a million dollars or more, it was expropriated without compensation. "They were real gentlemen," Alex said of the government officials. "They let us choose what we were going to give away.

"Nobody gave the land to us. We worked to buy it. Then somebody comes along and says you're too rich and there are too many people too poor. I understand the problem, but let's not take away land that is producing. Let's raise the tax rate and develop land for people who need it."

Aside from its high emotional content, land is, of course, basic to the well-being of Mexico's growing population. Only about 15 percent is considered suitable for crops, and not all of this is efficiently used. Much land that is marginal also is farmed. On the one hand Mexico needs the productivity of big, efficient farms; on the other she tries to deal with the pressures of the landless. Both groups complain.

"Very little is done," said Conrado López, leader of a small union of campesinos. "The government is afraid of the big shots." I met him outside the mayor's office in Culiacán, along with about 25 sun-browned men. They were there to demand that the government confiscate an idle tract, which Conrado estimated could feed 150 families.

Farm Workers Still Battle Poverty

The division between landowner and landless is sharpened in Sinaloa by conditions on the marvelously green vegetable farms. Conrado took me to a farm where migrant workers' houses were tar-paper shacks without electricity or sanitation. Water for all purposes was taken from a canal. One woman was washing clothes in the canal; another, herself. Another woman told me two families lived in her single room: her own of seven, another of four.

"Housing *is* bad," Alejandro Canelos agreed in his office. He then picked up an architect's drawings of a new project—640 housing units plus a supermarket and meeting hall—and smiled ruefully. "After I started planning this, the government came wanting land. The banks got scared and wouldn't lend money. I said, 'You idiots! If we don't build things like this, they'll take all the land.' I'm still going ahead with at least some of these buildings."

Under the hacienda system before the Revolution, most rural Mexicans lived as

Matador of the machine shop, a worker at Monterrey's Vidrio Plano plate-glass factory wears a protective leather cloak with openings for ventilation. On a break, he has removed his safety goggles. A do-it-yourself spirit of free enterprise prevails in Monterrey, an industrial dynamo that produces nearly a quarter of the country's manufactured goods with only 2.7 percent of the population.

serfs, bonded to big landowners. Most of the land that was subsequently distributed went into *ejidos,* community-owned tracts that were parceled out to campesinos. A family may occupy its *parcela* forever, but cannot sell it, rent it out, or mortgage it.

Over the years, the *ejidatario* became almost a ward of the state. "The government gives him credit and usually doesn't make him pay it back," a private landowner said unhappily. "He isn't encouraged to develop what he has."

New government programs and regulations are slowly changing the picture; some ejidatarios even have become peso millionaires. But the vast majority are bedrock poor. Near Zimatlán in the State of Oaxaca I visited Salustio González, 53, father of eight, possessor of three hectares. We talked beside his house, a lean-to of boards and

Defiance in stone, patriot Juan Martínez, known as El Pípila—*The Turkeycock*—

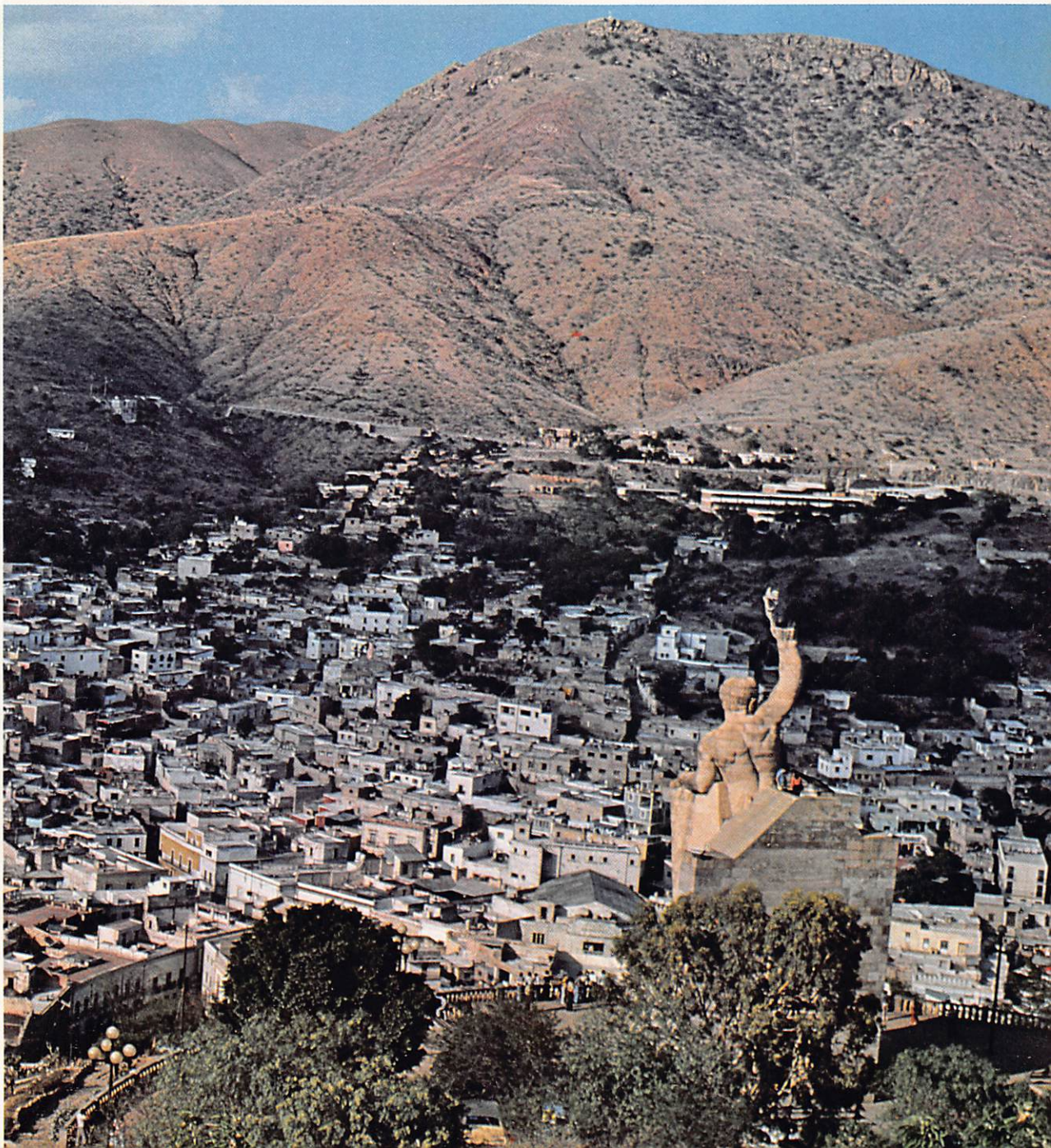
thatch. There was bitterness in Salustio's voice, for he feels he is no better off than his father was as a sharecropper, before Cárdenas gave him his plot.

"We are having to buy corn," Salustio told me. A flood had destroyed his crop the year before. Government officials had promised help with a dam. "But they forgot to come back," he said bleakly.

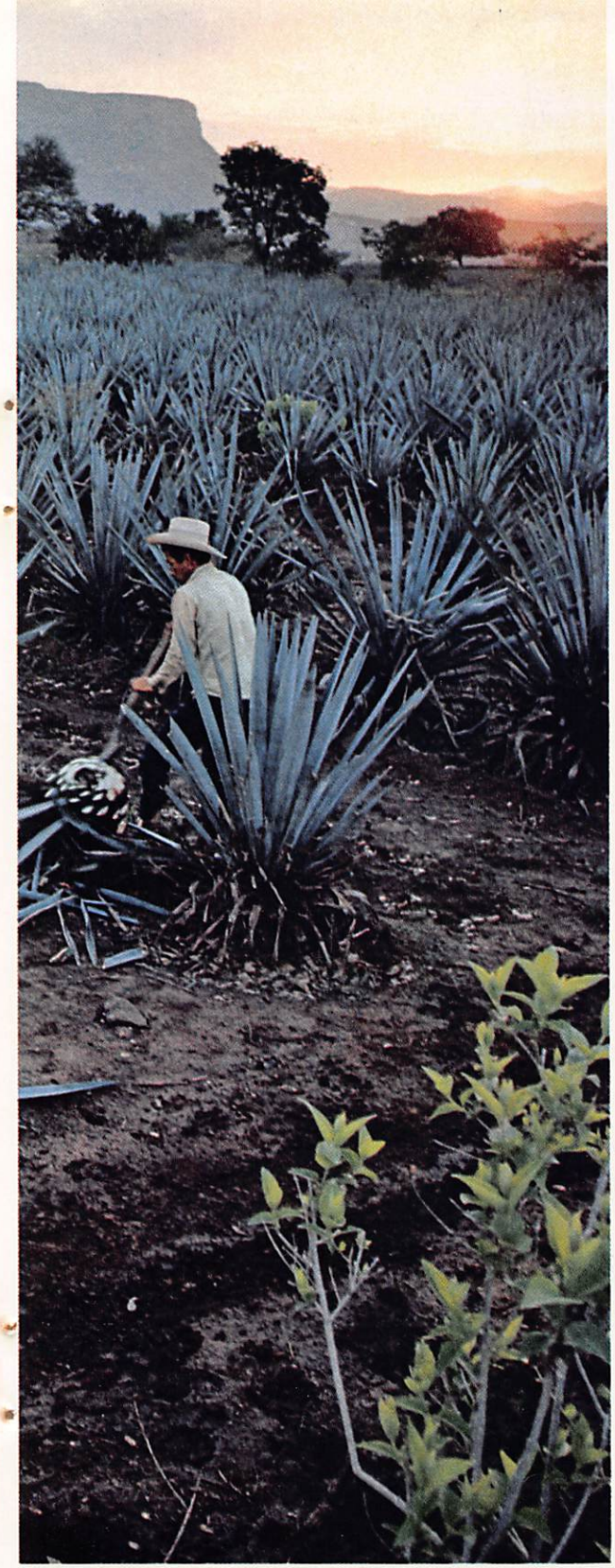
The production outlook is brighter in Trapiche, a few kilometers distant. The 125 members of the Cooperative Organization of Trapiche invaded 100 hectares, the remnant of a hacienda, and are farming collectively. Many experts say this approach is the best way to make ejidos productive.

David García Bozón, a founder of the cooperative, told me that irrigation permitted two crops a year. A government bank lent money for a tractor, "and we already

overlooks Guanajuato, in the land that cradled Mexico's war of independence. 631



Resembling overgrown pineapples, Agave tequilana *plants are stripped of their leaves near Achio. Their distilled juices yield the fiery and potent tequila,*



a national drink of Mexico and chief ingredient in the margarita.

have paid back half the loan," he said proudly. David thinks the government eventually will decide whether the collective can keep the land. Meanwhile, its warehouse brims with corn and beans.

The problems of rural development rest heavily upon a bearded young man who advises President López Portillo. I met Cassio Luiselli in his office on the grounds of the presidential residence, Los Pinos.

He does not foresee that the distribution of more land will destroy efficient farming operations. In fact, efficiency will be emphasized in new irrigation projects. "First of all we have to secure the nation's food supply," he said.

To help small farmers, President López Portillo has streamlined the agricultural bureaucracy and promised more technical help—to improve water supplies, for example, and to couple ejidos with such businesses as dairies and food-processing plants. In a major rural development program under way since 1973, the government has committed 1.2 billion dollars to such improvements, including drainage systems, credit, and self-help housing.

"We can work a whole package of programs," Cassio said. "But we must be honest with ourselves. It will not be enough to take care of rural unemployment."

When Acapulco Belongs to Mexicans

Edmundo Antúnez Torres, a carpenter, is a poor man. But once a year he and his family vacation at Acapulco. "There are 15 of us, and we came in two cars," he told me as he basked on the beach. "We have relatives here. There isn't room for all of us in the house; some of us sleep out in hammocks."

Thousands of others had made it to Acapulco for Holy Week—*Semana Santa*. They filled the streets and crushed one another in throbbing discos. Many slept in trucks and cooked on charcoal stoves on the sidewalks. On the beach they ate and ate: tacos, tortillas, fried shrimp, fried pork skins, iced sweets in half a dozen flavors, and slivers of pineapple, papaya, and watermelon.

"This is one week when Acapulco belongs to Mexico," said a salesman from the capital, Armando Reina. Practicing rusty English, he took my notebook and wrote, "This time is for we very happy."

In the Nahuatl tongue Acapulco means "place of the little reeds." But since the 1940's, when Errol Flynn and other celebrities discovered it, Acapulco has meant "glitter" (page 645).

It still beckons vacationists as famous as Dr. Henry Kissinger and the Reverend Billy Graham. It also lures secretaries from Chicago on five-day package tours and conventions of U. S. auto dealers and salesmen.

Crowded? Yes. But Acapulco's golden strand and golden sun remain, and on the ridges behind the hotels bougainvillea screams in fuchsia to passing bees.

And there still can be solitude. At sunup the fresh-washed beach is yours. I remember a dawn shared with a leathery fisherman named Mijandro, no one else in sight. Cast net ready, he stalked the water. Behind us rose the pyramidal Acapulco Princess, one of the most luscious hotels anywhere. Mijandro never even glanced at it.

Tourism—a Mexican Mainstay

Acapulco was host to 750,000 people last year, a fourth of all visitors touring Mexico. Because tourism not only earns foreign exchange—800 million dollars in 1977—but also creates jobs, the government has set out to double the number of visitors by 1982. That would give jobs to a million people.

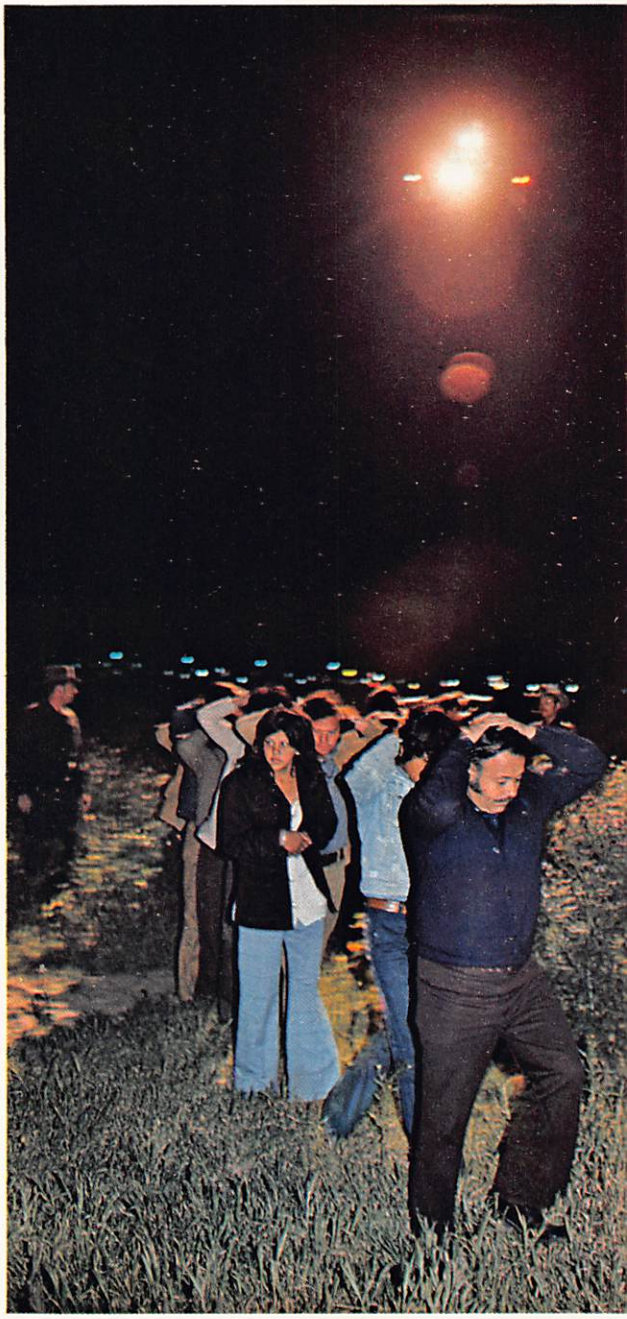
On the Pacific coast, hotelmen see no end of potential. Pedro Valle, president of the Acapulco Hotel and Motel Association, suggested that someday hotels will stretch from A to Z—from Acapulco to Zihuatanejo, 230 kilometers northwest. "Zihuatanejo looks like Acapulco did 30 years ago," Señor Valle said. I went northwest.

The World Bank lent 22 million dollars to develop tourism around this fishing village that nestles in the curve of a sapphire bay. At nearby Ixtapa Point I stayed in the gleaming El Presidente Hotel, then only five months old. Most of the guests were from Mexico City; the world has not heard much yet of Zihuatanejo. It will.

Belisario Ruiz Hernández, known as "Beli," a man of about 20 with dancing dark eyes, thinks the El Presidente is the best thing that ever happened. He was born on an ejido, one of ten children. "I had to leave the farm to find something to do," he said. He hands out beach towels to hotel guests,

Poverty's child, a youngster near Guanajuato tries to sell a bird to passersby (facing page). Fighting a losing battle, U. S. Border Patrol agents round up jobless Mexicans (below) attempting to cross the border near San Diego, California.

Bused back to Tijuana, some will try again the same night. No one knows how many succeed, but last year a million were apprehended.



Too poor for traffic jams, Netzahualcoyotl, a concrete-block satellite of Mexico City (right), burgeons with peasants fleeing rural poverty. A trained midwife who examines an expectant mother in a village near Puebla (below) may also distribute free birth-control aids under a government program to reduce one of the world's higher birthrates.

earning $118 a month plus tips—enough to keep him from drifting to Mexico City.

The mayor of the world's largest city has his hands full. By the most recent estimate, 8,628,024 people dwell within the 1,500 square kilometers of Mexico City. They demand water that must be pumped from distant valleys. They drive 1,300,000 vehicles—all of which seem to be prowling for a parking space at the same time.

But Carlos Hank González reckons these as matters that can be handled with money and greater efficiency. The mayor is more concerned with the effect of his jammed metropolis upon the soul. "When a man becomes just a number, he loses his identity, his personality," he said. "That's dangerous."

I waited for the mayor's arrival in a packed auditorium. TV cameras focused on his handsome face. Tall, commanding, by his own estimate a born politician, he obviously enjoyed the spotlight.

The occasion was the investiture of a neighborhood council. The Federal District, which is Mexico City, has no popular vote; the president appoints the mayor. "We need to rehumanize the city," the mayor told me. And one way, he decided, was to give citizens a voice on such subjects as schools and neighborhood services. So, last year, he arranged elections to create 16 councils.

He spoke bluntly to the new advisers: "People must help themselves. No one else is going to do it for us." He spoke of corruption, always a problem in Mexico. "Our city is morally dirty because we let it be that way, and it will continue that way as long as we tolerate bribery."

Growing by more than a thousand citizens a day, greater Mexico City may now have surpassed the metropolitan areas of

Tokyo, New York, Shanghai, and São Paulo, each with more than ten million people. Some planners think Mexico City and its sprawling suburbs will be swollen by thirty million by the end of this century.

I interrupt this doomsday message to declare that Mexico City remains to me enormously exciting, in ways great and small. Consider:

• In all the periods of its history—going back to the Aztec temple builders—architects have set out to dazzle us here, and all have succeeded. Recent builders did it with the mural-splashed campus of the National University, with the National Museum of Anthropology, and just lately with the soaring new Basilica of Our Lady of Guadalupe.

I am equally dazzled by churches and government edifices of the colonial period that survive near the great Zócalo. Settling into the ooze that was the bed of Lake Texcoco, they tilt and sink as if on putty. Much of this area is shabby—but architecturally magnificent.

• Mexico City boasts a magnificent in-use collection of jalopies. A '41 Chevy is not even remarkable. One day I spotted two of a rarer species, postwar Packards.

• Mexico City may speak more languages than any other metropolis in the New World. I visited a man whose first language was Tlapanec, spoken around the town of Tlacoapa in Guerrero State. "I couldn't speak Spanish when I came to the city in 1965," Julio Espinosa Martínez said. He still speaks Tlapanec with others from his birthplace and teaches it to his children.

In Tlacoapa Julio probably would have been a poor farmer; in the city he became an accountant. "For me, to leave was the only way to progress," he said. He still cannot forget his mother's tears as he departed.

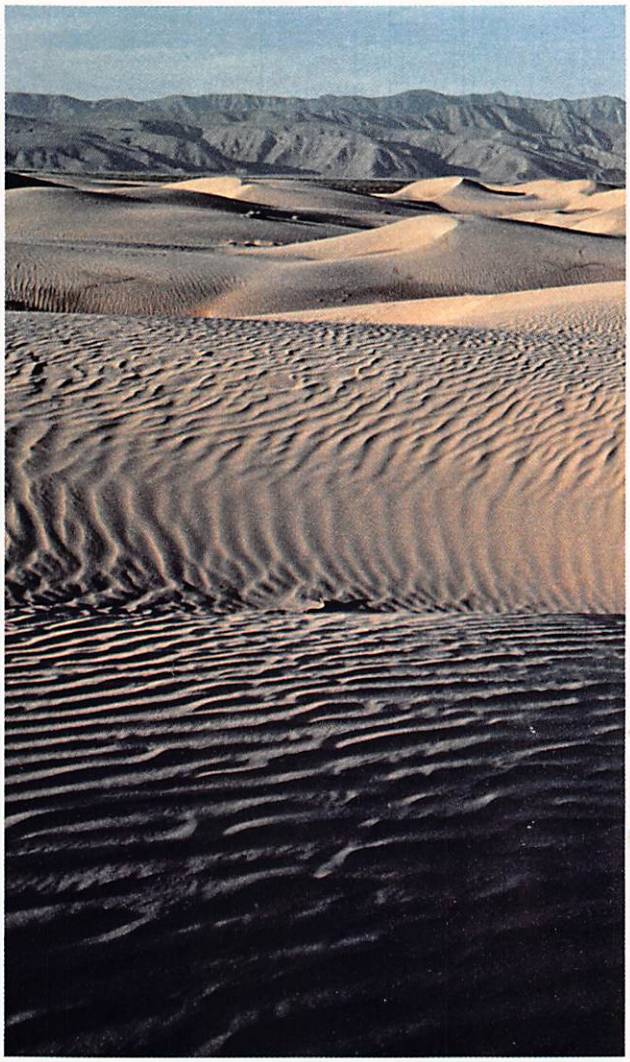
Migrants Drawn to Capital's Slums

Out by the airport, on the boundary of the Federal District, live other Julios. The satellite city of Netzahualcoyotl—"Netza" to its 1,800,000 residents—is a somber slum: gray earth that the rain turns to mud, and gray houses of concrete block (preceding page).

"It is better to live here," vouched a woman named Gloria, who came to Netza from Tlaxcala State. "I have gotten used to it. I have everything I want, and our children have more to do." Her husband sells bread on the street. Still, Gloria spoke a bit wistfully of the country. "My husband's family had land—*¡muy bonito!* I wish I could show it to you." But neither she nor anyone else I met in Netza wanted to return.

"That is because they were starving there," Fernando Jiménez said. "At least they have a chance to make a living here."

I met Fernando and Hanna Bravo Betancourt, both medical students, in the clinic where they work. Women and children waited for medical attention, for which they pay about 75 cents if they have money. But a greater service of the clinic, which was founded by volunteers, is education. Once a



Limned by the setting sun,

week clinic-trained hygienists visit groups of housewives.

"They talk about sanitation, diet, immunizations," Hanna said. "The people are poor, but they can do many things to have better health. Still, what we do is very little compared to the problems. Sometimes we wonder if we are doing any good."

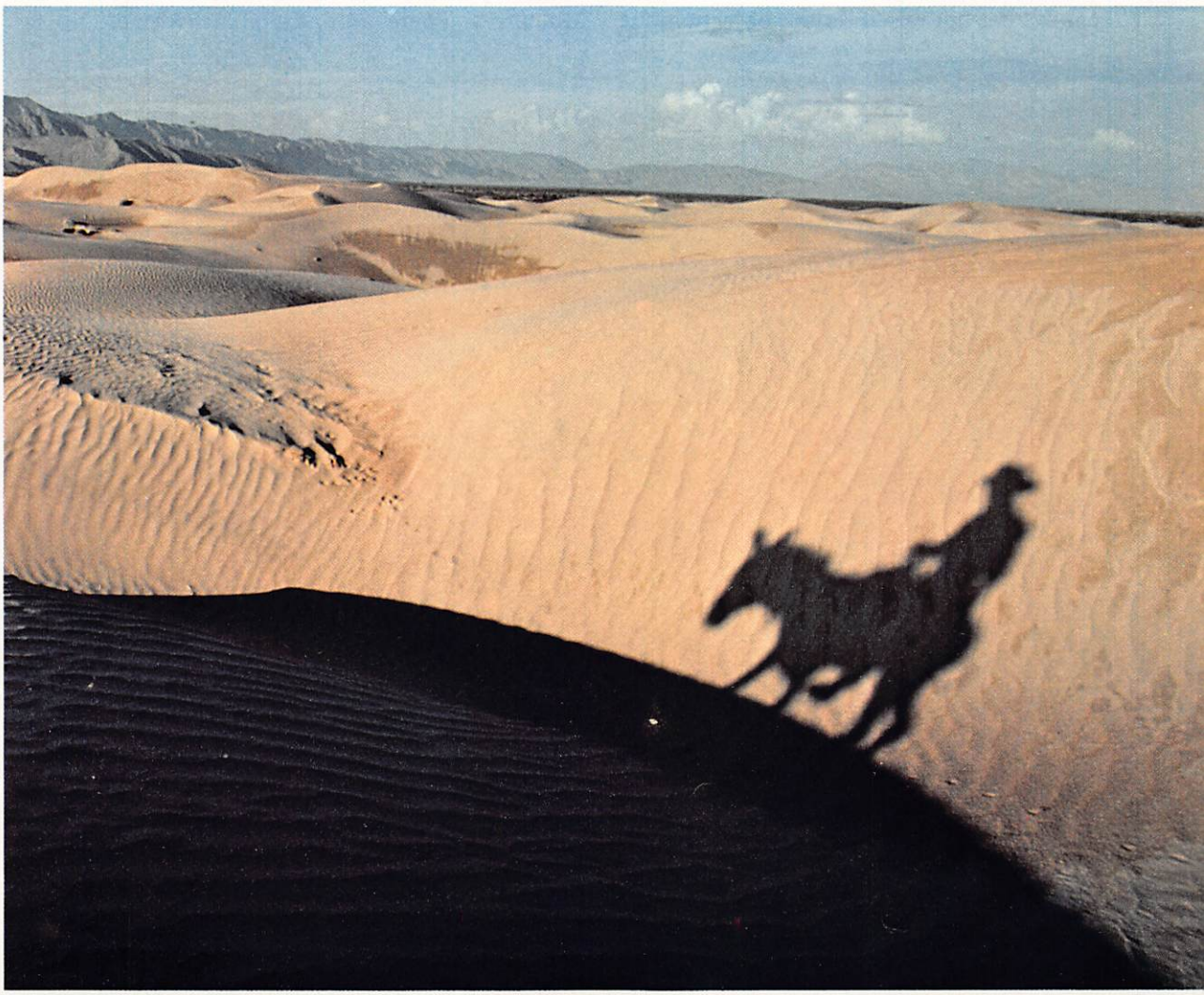
"But we have to try," Fernando said.

Try—a big word in Netza. Slum that it is, it is better than it was a few years ago. Main streets have been paved. Some homes have electricity and running water, and better police protection has reduced crime.

One of my favorite restaurants is the Café Tacuba, near the Zócalo. The chili sauce on chicken enchiladas is just piquant enough to demand a washing down with one of Mexico's great treats, dark Dos Equis beer.

I met the restaurant's food buyer, a small but lively man in his 70's, Santos Hernández. Students of anthropology will recognize him as Jesús Sánchez, the stern father in *The Children of Sánchez*. Author Oscar Lewis masked Sánchez's identity in this classic study of a poor Mexican family, published in 1961 and now the basis for a movie.

I subsequently visited the Hernández home, a plain, pleasant concrete-block building on the city's outskirts. Two girls, 4 and 5 years old, played nearby as we talked. Granddaughters, I assumed.



the shadow of a man and his burro rides the desert sands near Viesca.

"My daughters," Señor Hernández corrected. The children of Sánchez now number twenty by four wives.

While Señor Hernández's achievements are on the high side, a family with six or eight youngsters is not unusual. This is why Mexico will have from 110 to 135 million people by the end of the century, depending on the success of efforts to slow the growth.

A worried President López Portillo ordered Mexico's responsible-parenthood campaign expanded. Billboards and radio stations, broadcasting in several languages, carry the government's message: "Small families live better."

One feature of the government campaign is free family-planning services. Although Mexico is mostly Roman Catholic, the church has not raised serious objection. "It is all right to have a small family now," I was assured by a mother of four whom I met at the Basilica of Guadalupe. She was making her annual pilgrimage to this shrine, as millions have done from Mexico and beyond.

It pleases Dr. Jorge Martínez Manautou, who coordinates the family-planning efforts of national health agencies, that the population growth rate appears to have declined. The official figures: from 3.5 to 3.1 or 3.2 percent. With the help of a sizable army of family advisers, he aims for a rate of 2.5 by 1982. "But it will be difficult," he said. "The easy part—reaching educated people in the cities—is behind us."

Beer Was Mother to Monterrey

For my continuing education, I went to Monterrey. There, around a table in a quiet

room, eight men and women contemplated their beers—three glasses each. They sniffed, sipped, and scribbled.

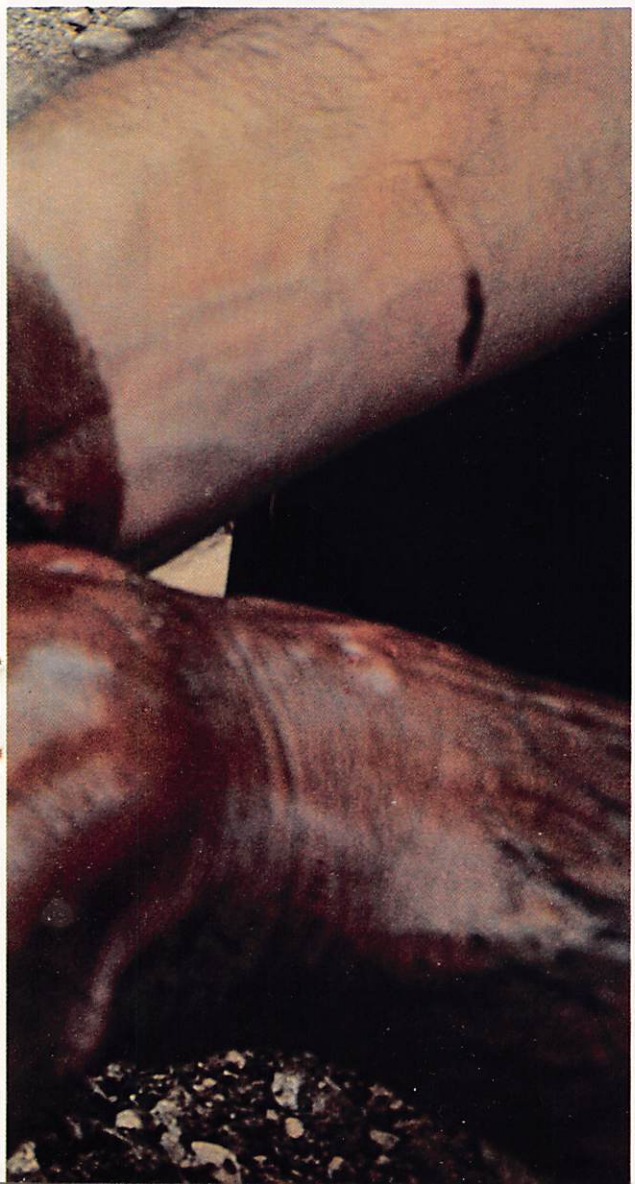
Presently they passed their notes to Arnulfo Canales. Thumbing them, he concluded: "Four of us identified the unique beer, four did not. It is a standoff."

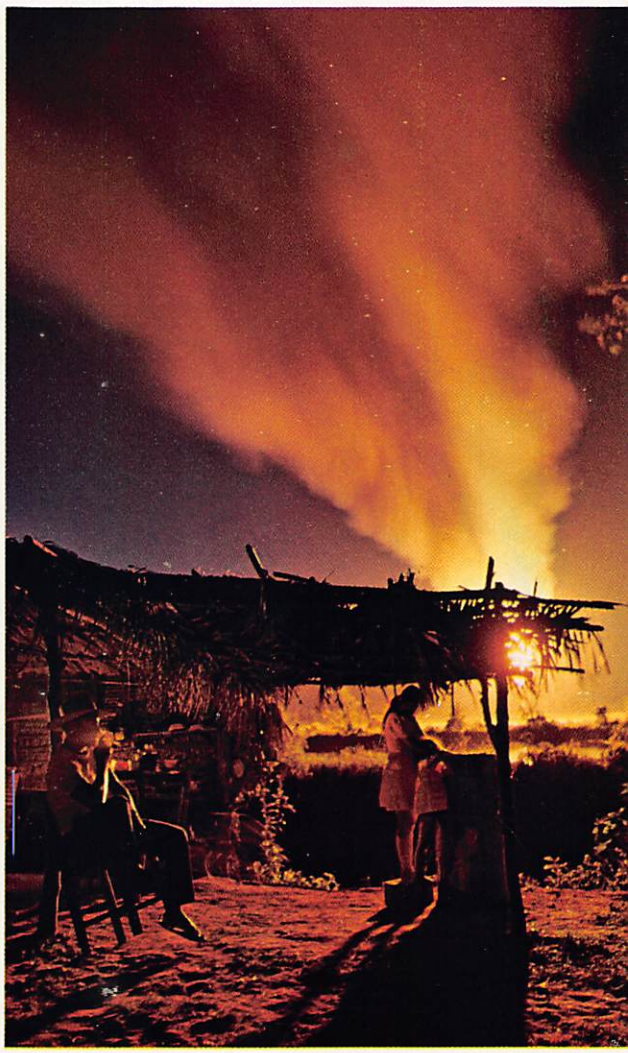
This pleased Dr. Canales, quality-control manager for Cervecería Cuauhtémoc. A slight change in the brewing process had not altered the taste of Carta Blanca beer sufficiently for expert tasters to agree which of their three samples was different. "Which means," he said, "that the average beer drinker will not be aware of the change."

Second only to the capital in industry, Monterrey owes much to beer. "This brewery was the mother industry here," said Cuauhtémoc's director general, Alejandro

Handful of plenty, oil reflects a drilling rig near Villahermosa (left) as well as brighter prospects ahead for the country's economy. Though official figures list the country's proven reserves at 14.6 billion barrels, experts calculate the total at 120 billion barrels—about twelve times as much as Alaska's North Slope.

With the oil come discoveries of immense fields of natural gas. Burning off waste gas turns darkness into daylight for villagers near Reforma (below). A pipeline under construction to Monterrey may eventually be extended to the U. S. border.





At the flick of a ceiling that can open to admit sunlight, indoors becomes outdoors for Octaviano Longoria and his wife, Jeanette, in their Mexico City home.

Longoria made his fortune in wheat, cotton gins, and vegetable oils. Like many businessmen he feels that Mexico may be on the road to economic recovery.

Shunning the shade from a thatched palapa, *tourists from colder climes sit on the sunny side of the pool bar at the Cancún Caribe (below), another of the resort hotels sprouting on Cancún Island near the Yucatán Peninsula. Famed Acapulco's hotel-studded beaches (facing page) may soon have a rival at Zihuatanejo on the Pacific coast, where a new resort is being built. Others are planned.*

Thus the country prospects for tourists as diligently as it does for oil. Last year tourism and oil vied for second place, after agricultural exports, as producers of foreign revenue.

Garza Lagüera, whom I met after seeing the testing of his product. Señor Garza's grandfather was one of the founders in 1890.

Industry begat industry: after the brewery, a malt plant and factories to make bottles, cartons, bottle caps, cans. As Monterrey grew, it attracted more workers, more brain power, more industries. "It was like a whirlpool, sucking everything in," one executive said of the past three decades of development. Today 400,000 workers produce steel, truck bodies, batteries, light bulbs, and dozens of other products.

Many factories are subsidiaries or partners of U. S. firms, and English is spoken widely. And the city hustles. The Monterrey Institute of Technology and Higher Studies is a private educational institution of highest repute. The rector, Fernando García Roel, summarized its pragmatically Yanqui-fied philosophy: "Ninety percent of our budget comes from what the students pay. If they cannot get back the money they spend with us within two or three years after they leave, other students won't come here."

The institute specializes in skills its graduates can use immediately: computer science, engineering, business administration.

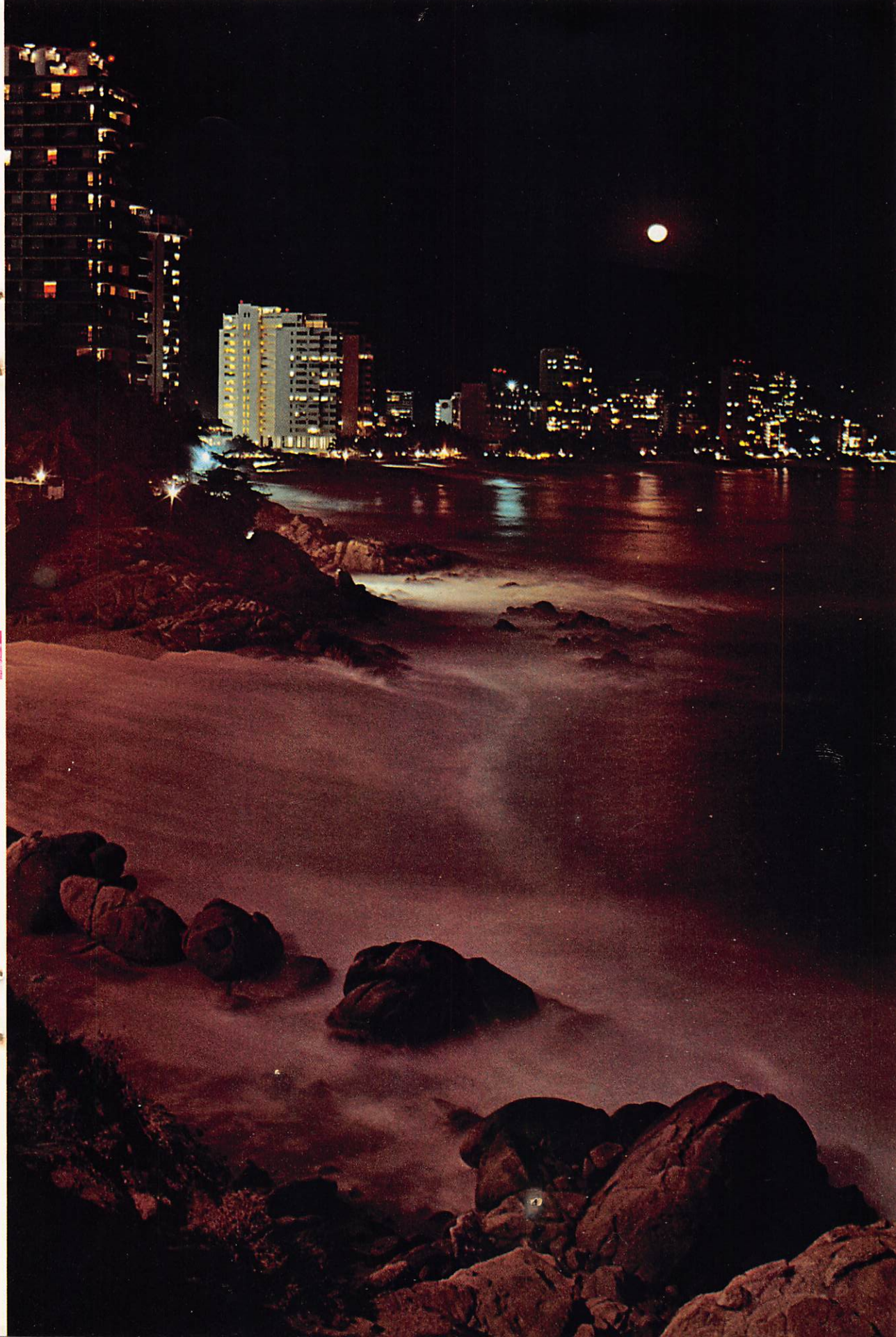
"We Are Many and Will Be More"

The Monterrey whirlpool has sucked in too many people, including thousands of rural men. "We can't continue to receive everybody who wants to come to Monterrey," Director General Garza remarked at the brewery. "Industry needs skills, and these people have none."

I drove into a squatter area where streets of rock and dust teemed with malnourished children. Red stars had been painted on some of the buildings. On a truck body elevated on concrete piers, a curious gateway symbol, was a slogan from the Revolution: "We are many and will be more."

Monterrey industrialists have pledged to create 300,000 new jobs by 1982. Even so, of the poor there will be more in Mexico.

On a rainy evening in Mexico City I followed heavy traffic into Chapultepec Park and went to Los Pinos. Like all recent occupants of the presidential residence, José López Portillo came to office via the Partido Revolucionario Institucional, the PRI. No important opposition party exists, but the



PRI is open to a spectrum of philosophies. The thrust of an administration depends upon the president. The man can be dictator or democrat; some have seemed to be both.

I carried two books to Los Pinos. *Quetzalcoatl* retells a famous Indian legend, while *Don Q* is a chronicle of philosophic conversations between an older man and a younger one. In these books the author, José López Portillo, exhibits a dazzling way with words and a beautifully educated mind.

I asked the president to autograph my copies when he entered the large office where I waited. He was only five minutes behind in his schedule. "You could have led an easier life as a man of letters," I said. "Why are you in politics?"

"I'm only the president of the republic," he answered with a grin and a shrug. Then he reminded me that he had written political science texts too. In fact, it was as a professor of political theory that he was drawn into government in 1960.

"Last Chance for the Revolution"

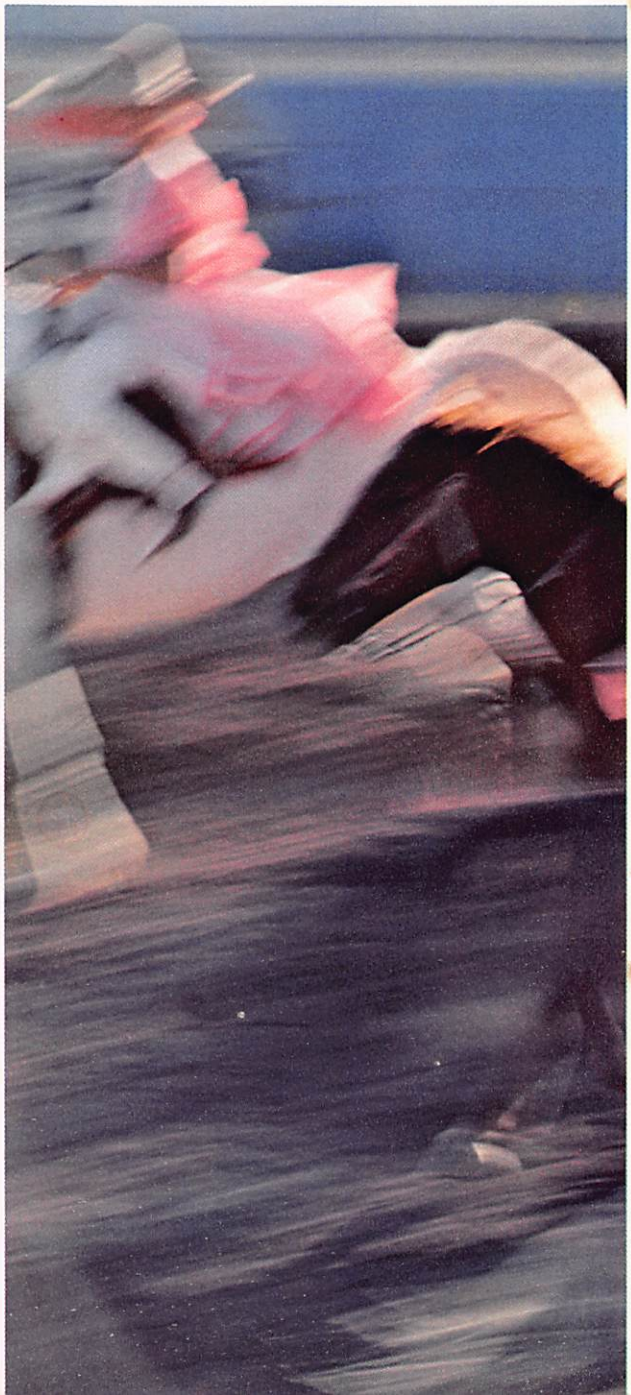
There is little time for writing now—"just political speeches. But I am keeping notes." Mexican politicians seldom write memoirs; he would like to change that when his term ends in 1982.

It should be a fascinating account. The president has declared that his administration "could well be the last chance for the Revolution and its concepts to solve the nation's problems."

He acknowledged the difficulties. "Our development up to the 1970's was based on monetary stability, price stability, and political stability. We only have the political stability left." That sturdiness has been called the most important contribution of the PRI. Will it be enough to allow the republic to work out its problems? The president believes it will.

The easiest way for Mexico to tackle its economic difficulties, though it would take some years to gear up to it, would be to pump oil and gas as if there were no tomorrow.

"But if we were to base our solutions only on oil, we would be a crippled country," he said. "We have to be very careful of the depletion rate. We are responsible for future generations." Mexico has other resources, he reminded me. "It would be irresponsible not to use them." Oil will play a part, "but we have many feet on which to walk."



Pageantry of the past still has its day as young girls open a charreada *in Chihuahua. This Mexican cousin of the rodeo brings the skills of the* charro, *or cowboy, to the arena of competition. In the same spirit, a determined country seeks to meet the challenges of the present.*

It is too bad for him, I said, that he came along as president when so many difficulties had to be confronted. He almost rose from his chair to rebut me. "This is precisely the time in which I would like to live, the time of the most serious problems. It is a very beautiful challenge."

One cannot help but like a man who accepts a challenge.

Modern Mexican presidents are limited to one term of six years. Save for Cárdenas, they have not been remembered with great affection at the end. Rather, praise flows to the man at the start of his term. His portrait is printed by the thousands months before an election; everyone knows who will win.

In a small town, speaking with an official seated beneath a heroic López Portillo, I asked what was done with the likenesses of previous executives. "Oh, we put those away in a closet," he said.

If José López Portillo can meet his challenges, he will earn a much greater place—in the hearts of his countrymen. □

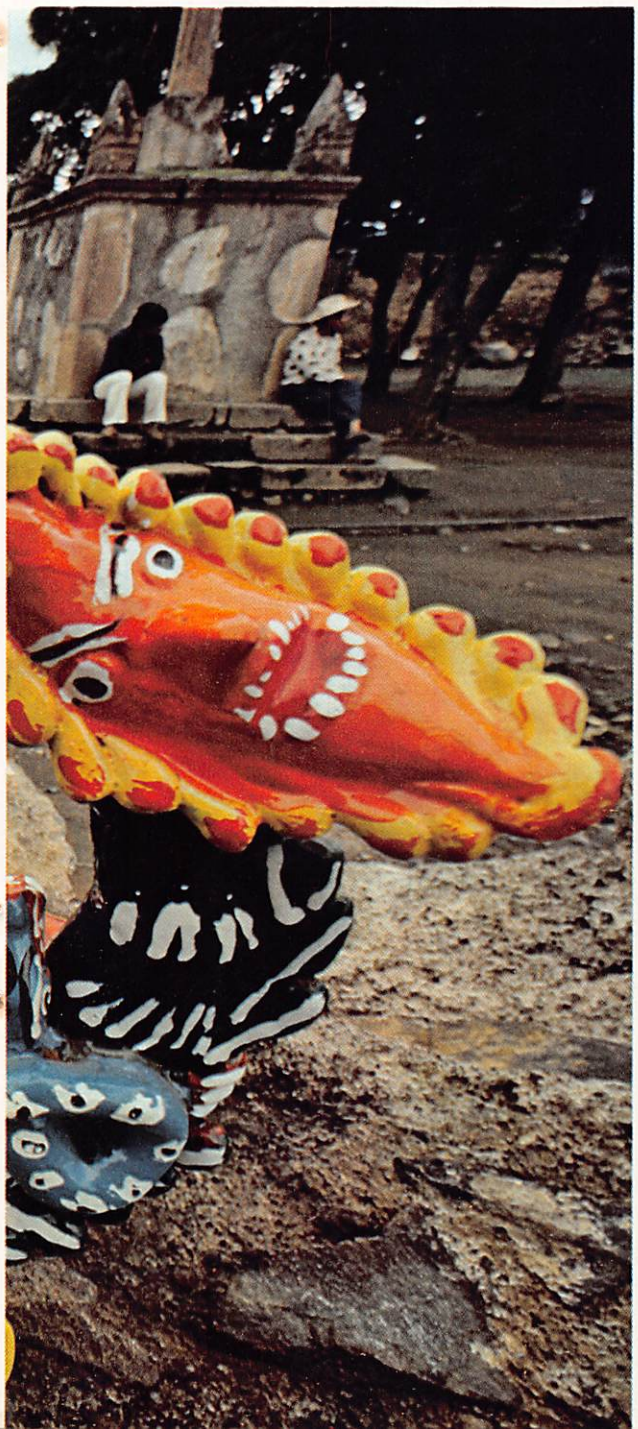
It's a way of life

MEXICAN FOLK

ART

By FERNANDO HORCASITAS
INSTITUTE OF ANTHROPOLOGICAL RESEARCH, NATIONAL UNIVERSITY OF MEXICO

Photographs by DAVID HISER



"WHY DO YOU MAKE all these clay whistles, Doña Albina?" I pointed to dozens of whistles on the floor, shaped like various animals. "Don't you have sons and daughters to support you?"

The 65-year-old potter looked up from the beans she was sorting and laughed. "Well, sometimes I feel sleepy or out of sorts, and so I start making them. It's nice to feel my hands in the clay, and soon I am wide awake and in a good mood. Then, when I am finished, I line up all the little horses and owls on the floor and keep looking at them. They are ready to be fired, and I really feel good."

I could hear the voice of creation. In Doña Albina's simple words I caught an echo of anxiety—even torment, the ardent desire to release a burden—and the final delight of every artist in the history of mankind.

We were far from the world of the assembly line, in the Tarascan Indian village of Ocumicho in Mexico's western State of Michoacán. This little community produces not only toy whistles but also painted devil figurines, all in small quantities since everyone here lives off the land, not by making pottery. Full-time professionalism is rare, but two little girls who were playing at making mud tortillas in Doña Albina's yard were

Mocking yet pious, clay devils grapple with the souls of the damned. The hand-size figurines are created by Tarascan Indians of Ocumicho village. With such vibrant displays of imagination, Mexican folk artists link the ancient past with the changing present, the spiritual world with the physical, in continual celebration of the cycles of life and death.

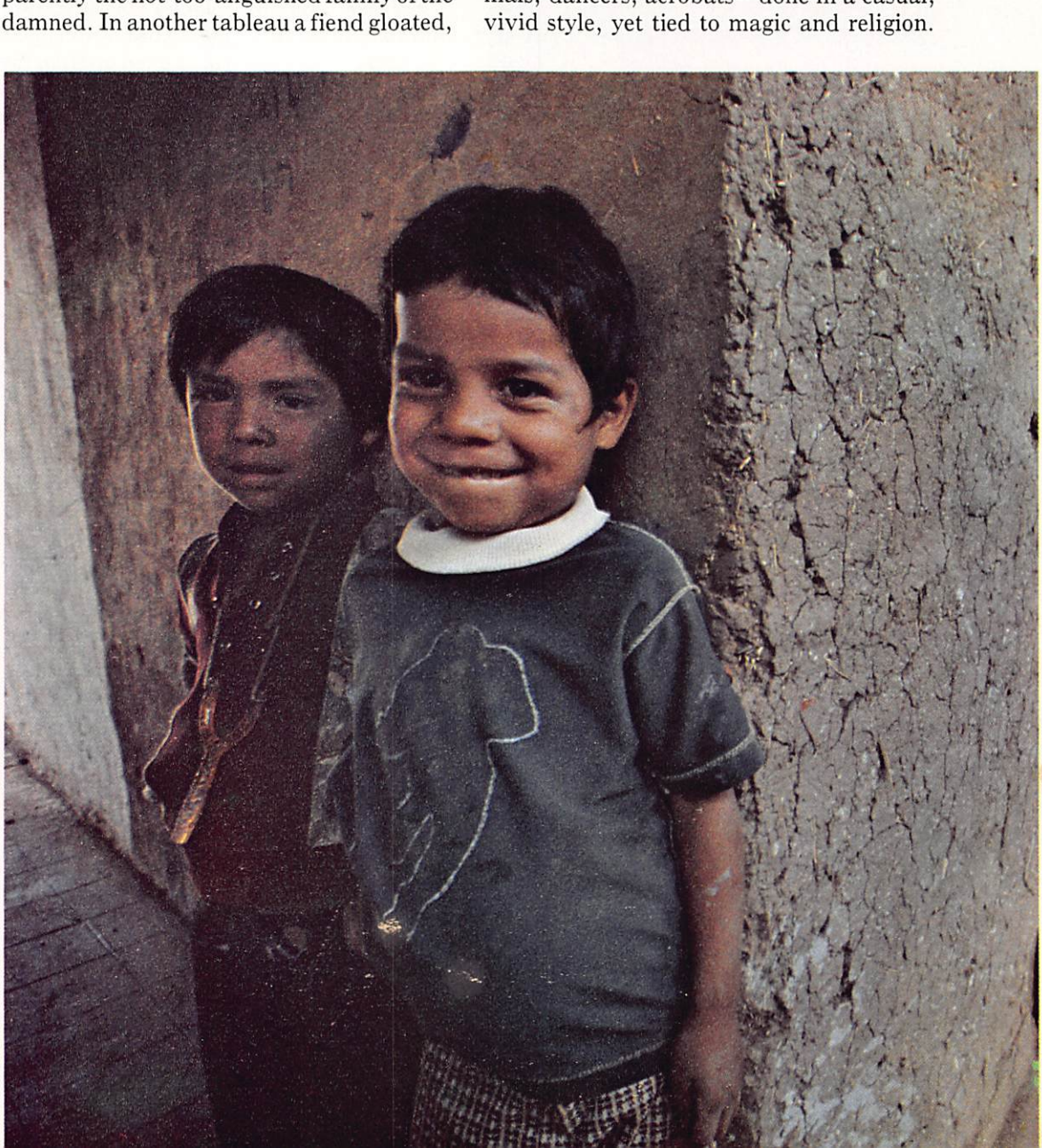
preparing unconsciously for a part-time occupation in their adult life.

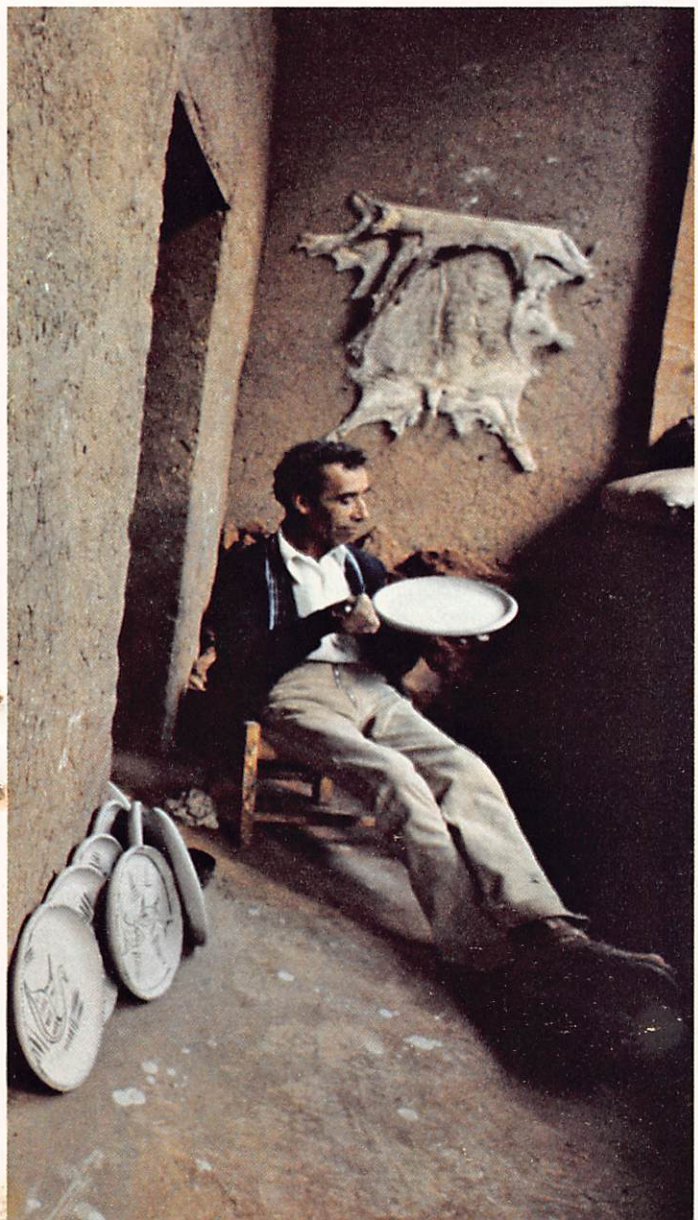
In the same village I visited Don Teodoro, a creator of "devils." This unusual craft was born in Ocumicho some twenty years ago, but because the innovator died violently, some families have misgivings about "devil making." Far from fearing his devils, Don Teodoro finds roguish enjoyment in them. Invented, molded, fired, and painted in garish colors by him and his family, the devils are insolent and insouciant. They prance, romp, laugh at the spectator, causing amusement rather than the fear of hellfire.

Don Teodoro pointed to a gleeful demon surrounded by dozens of placid faces—apparently the not-too-anguished family of the damned. In another tableau a fiend gloated, his oversize red tongue hanging out, as the Virgin of Guadalupe cowered in terror by his side. Nevertheless, Don Teodoro's family is a pious one, and they see no conflict between their faith and their devils, which burst with tenderness and humanity, and, above all, with the humor that characterizes much Mexican folk art.

Animals, Dancers, and Acrobats Cavort

For almost 3,000 years before the Spanish conquest, Indian crafts were noted for humor and strong ties to the supernatural. Some of the earliest clay figurines from Tlatilco, now overspread by Mexico City, are frolicsome creatures from daily life—animals, dancers, acrobats—done in a casual, vivid style, yet tied to magic and religion.

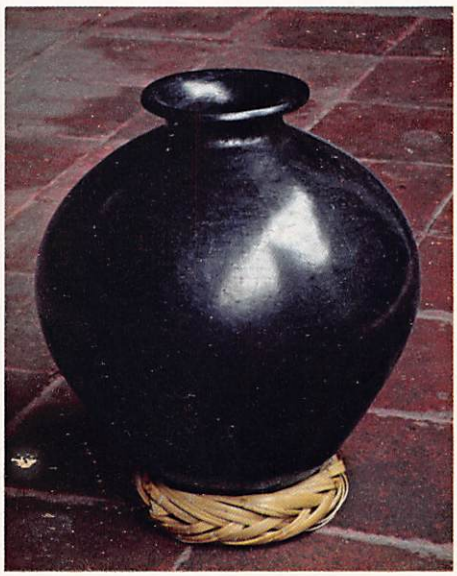


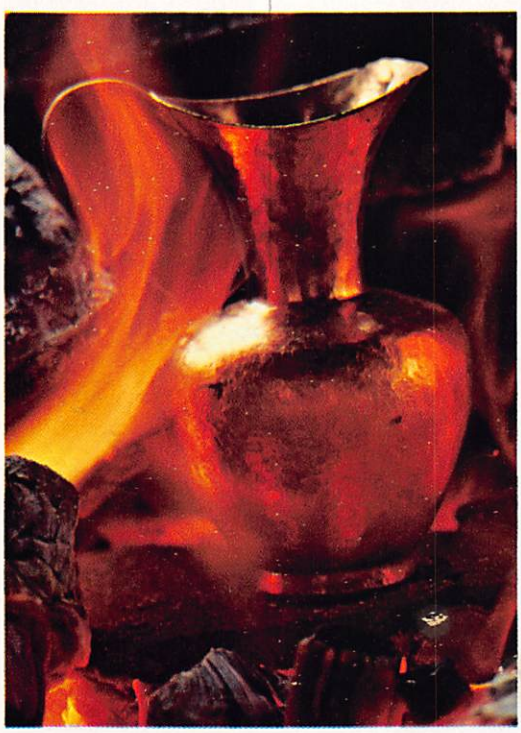


Wherever there is clay, Mexicans work it into familiar forms. In the Chiapas highlands Maya women fire cooking pots in a street kiln of burning logs (above).

To make the lustrous black water jar (below), Zapotec potter Doña Rosa of Oaxaca burnished the ferric-clay vessel with stones, then baked it in an almost airtight kiln. The resulting black ware resembles vessels found at Zapotec sites dating from as early as A.D. *700.*

Near Lake Pátzcuaro, Mestizo craftsman Faustino Peña (left) adds fishing scenes and glaze to platters.





They were often used as funerary wares.

After 1521 Spanish conquerors brought joyous and florid styles, the consequence of the merging in Spain of Celts, Romans, Arabs, and other Mediterranean peoples. Mexican folk art is a fabric so finely interwoven of Indian and Spanish influences that it is almost impossible to separate the two. One thing is certain: Both cultures have contributed to a curious mixture of lightheartedness and religiosity.

Prayer Precedes Creation in Clay

Religious faith colors the creation of beautiful objects in all rural areas. On the walls of workrooms in peasant communities—often porches, bedrooms, kitchens, or storerooms—it is common to see a shrine decorated with paper flowers, its saint dimly illuminated by vigil lights. An old woman told me how she starts a pottery-making day: "I take the chunks of dry clay and start grinding them. But first I say, 'O Father Jesus, help me. You have given me this gift. Let the owl whistles come out well. In the name of the Father and of the Son and of the Holy Spirit. Amen.'"

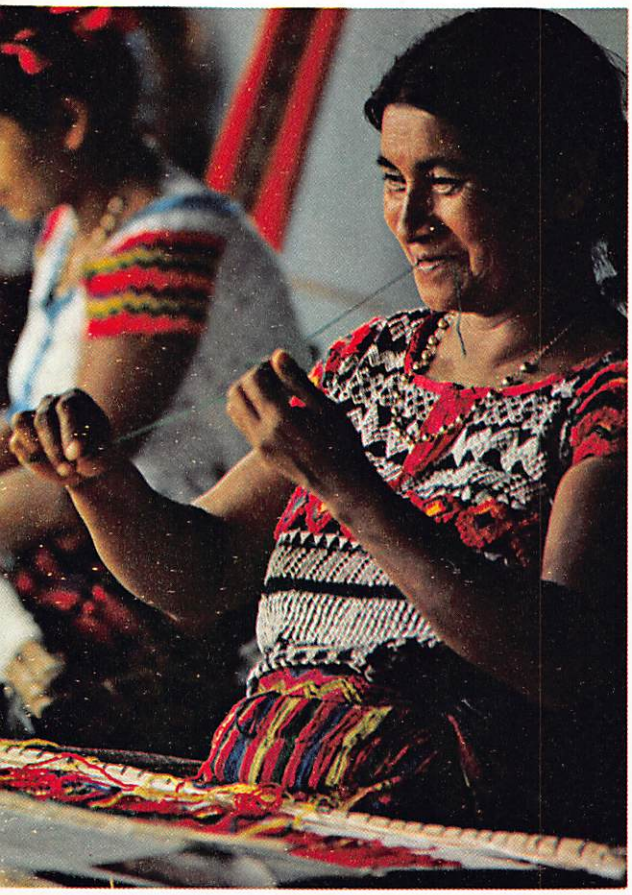
In the town of Patamban I chatted with another artisan, Don Miguel, a Tarascan of the old school, who disdains Spanish for household conversation in favor of his native tongue. He designs and executes intricate wax flowers for the church altar.

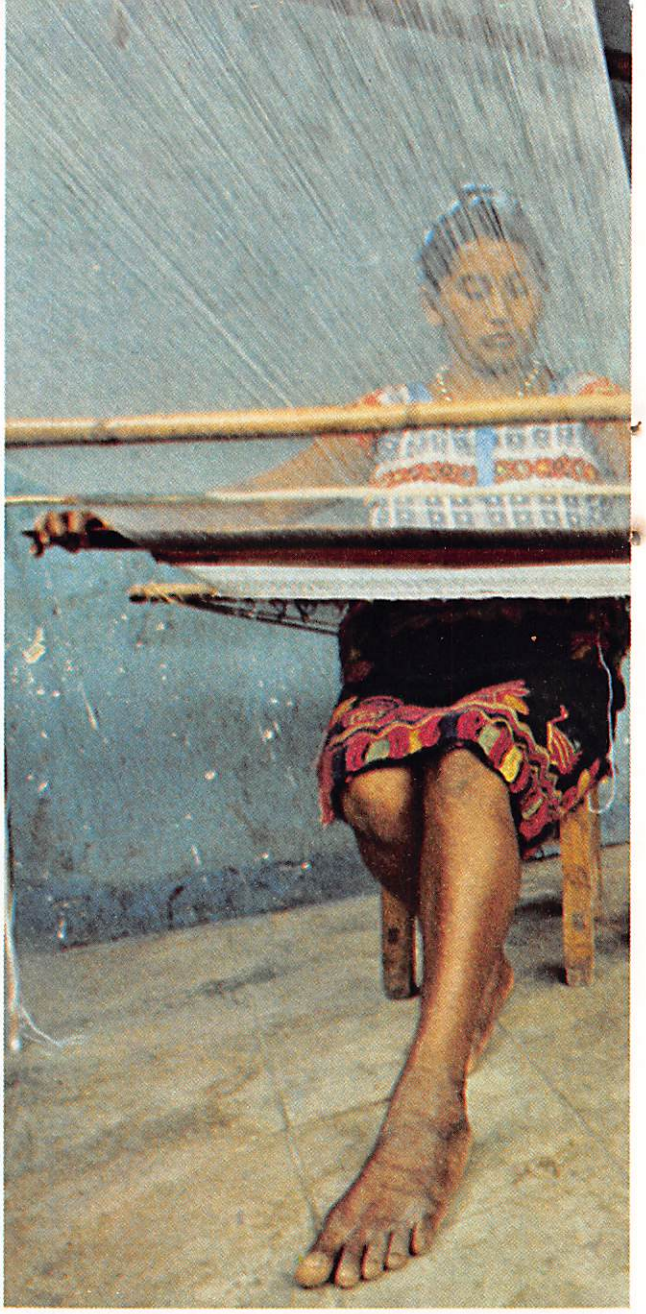
Precious metals that sparked the Spanish conquest now go into treasured adornments for the Mexican people. Luis Woolrich (upper left) of Tehuantepec treats old coins like precious gems, setting them in 24-karat gold. He displays $40,000 worth of gold on this table.

Stringer full of silver fish (right), a necklace made in Pátzcuaro may adorn a bride. After the conquest the new rulers tried to outlaw the brilliant Indian metalwork, which included mosaic, lost-wax, and repoussé; Indian objects were melted into bullion.

Tarascan Indians once made copper bells. Now in Santa Clara del Cobre, near Morelia, they recycle pots and wire into utensils and miniatures such as a five-inch pitcher (left).

Ancient loomcraft brightens the future for Maya women of Chiapas. For centuries they tied belt looms to tree or post to weave cotton huipiles, *or blouses. Recently, Pascuala Calvo Solano (below) helped organize 500 neighbors of Venustiano Carranza into a guild to market huipiles. Her sisters (right) weave abstract designs of spiny stars like those in ancient Maya wall paintings.*





Often in the form of arches, the flowers are paper-thin wax creations of many colors, no two alike. They are commissioned by local people who wish to honor a particular saint.

"As the day approaches, and as I am getting behind in my work," Don Miguel complains, "I start worrying and can't sleep. In the middle of the night I think up an arch. Should the top be pointed or squared off? Should the circles on the sides be larger or smaller? In my mind I make the changes, then I go back to my original design, and then I start making changes all over again.

"It takes me days and nights of thinking before I put my hands to the wax. Some mornings I go off to the hills on foot to find a solution. I walk up and down, singing hymns. One day recently I was singing my loudest hymn when I met a shepherd who ran off without even greeting me. He must have thought I was crazy."

Beneath all Don Miguel's uneasiness I sensed his certainty that, when the day came, a magnificent arch of wax flowers would grace the saint's image on the altar. It would be illuminated by hundreds of flickering candles, and, in the background, enveloped in a cloud of incense, the artist would

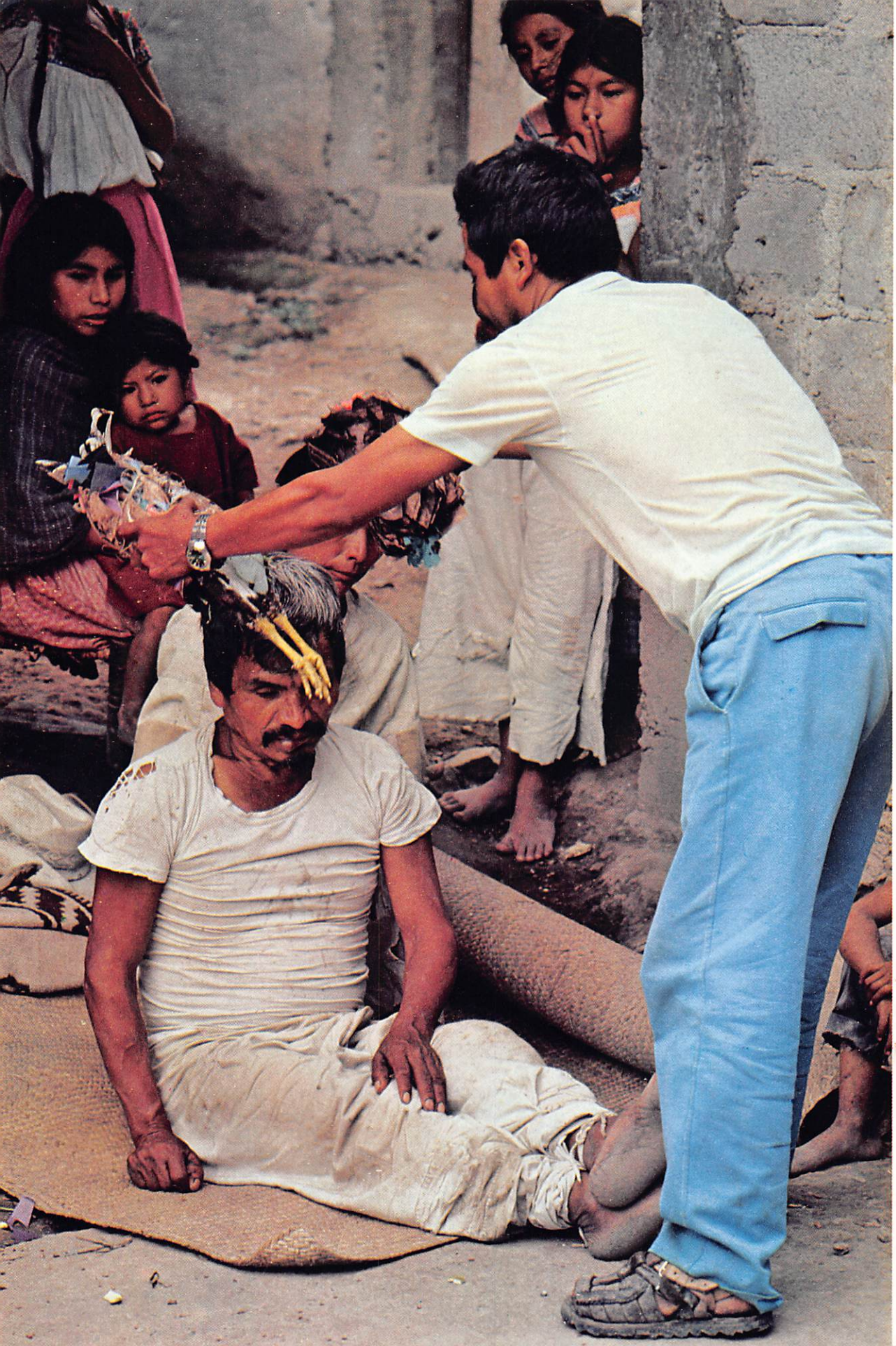
stand, listening to the prayers, satisfied that his nights of anxiety had produced something to be proud of—that even the lone shepherd had not been scared off in vain.

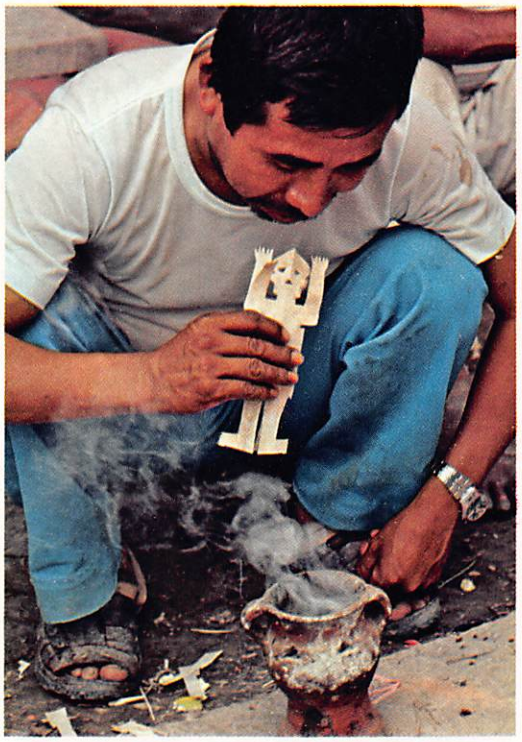
Big Order Poses a Dilemma

Don Miguel's nephew Neftalí is a potter. He has an order for a thousand pinecone-shaped clay coin banks from Mexico City, and they must be delivered in a month's time. Neftalí can make only about 15 a day and has decided to supply only a hundred "whether they like it or not." Furthermore, he claims, the price is not just: about a dollar apiece, which means his net is almost nothing. He cannot find experienced assistants, and if he could, paying them a salary would raise his price considerably.

Neftalí's dilemma reminded me of an old story. It could be entitled "More Expensive by the Dozen." The stranger goes to a village and finds he can buy a beautiful pot (or mat) for 10 U. S. cents. Thinking he can do a great business, he asks how much a thousand will cost. He is flabbergasted to find that a thousand will cost 20 cents each.

This situation does not arise from lack of enterprise by the artisan. The village





Magical power of bark-paper dolls wrapping a chicken sacrifice draws evil spirits from an ailing Otomí Indian (facing page). Healer Alfonso García works at San Pablito, in Puebla State, center of the papermaking craft.

To bring a loved one back to a woman suffering "loss of heart," García suspends curing dolls over incense (left), then directs the patient to feed, love, and honor the effigies.

Ceremonial use of bark paper dates back at least to the 16th century, when Aztec rulers exacted bark-paper tribute for use in rituals and hieroglyphic books known as codices. Today's craftsmen of San Pablito use ancient stone tools to beat tree bark into fine-textured paper. Some 400 kilometers away, Nahua Indians of Ameyaltepec, descended from the Aztecs, import the paper and paint scenes of village life, such as the corn harvest (above). Bark-paper painting, begun in the 1950's, earns tourist dollars.

craftsman is not running a factory. He works almost alone, aided only by his immediate family, often children under 10 years of age, and he does not pay these collaborators. Hiring outsiders would raise his prices. He and his family are selling their labor cheaply, though their creations are generally superior to factory-made goods.

A money economy is new to many village artisans. Though the mint in Mexico City was the first in the New World (1535) and Mexican pieces of eight were once international currency, two or three generations ago rural commerce was largely by barter.

Older potters of Ocumicho remember how men, women, and children used to carry their tiny loads of homemade whistles on their backs to neighboring villages on market days. The traditional barter still goes on to some extent, but values have changed.

"Years ago," complained one old woman, "they used to give me ten oranges for a whistle. Now they take the whistle and give me an orange so small you can barely see it!"

Hundreds of kilometers eastward from the Tarascan area lies the mountain village of San Pablito in the State of Puebla. Twenty years ago it was an isolated community of simple huts, and very few of its Otomí inhabitants spoke Spanish. Today a school flourishes, and the people speak proudly of a highway that will link the community with large cities to east and west. Modernization, though, does not seem to have diminished the local artisans' interest or skill in weaving and making bark paper.

As I walked through the shady paths of San Pablito, I glimpsed women seated in

Inspired by the stately women of Tehuantepec, pottery stands hold water jars waist high (right). The widest bowl contains sand to keep the water cool. An 18-inch clay market woman with a fish and a bread ring (left) became an angel when Zapotec potter Teodora Blanco added wings and flowers. Virgin of Talpa molded from chicle, or gum, makes a palm-size souvenir (above) for pilgrims to her shrine.

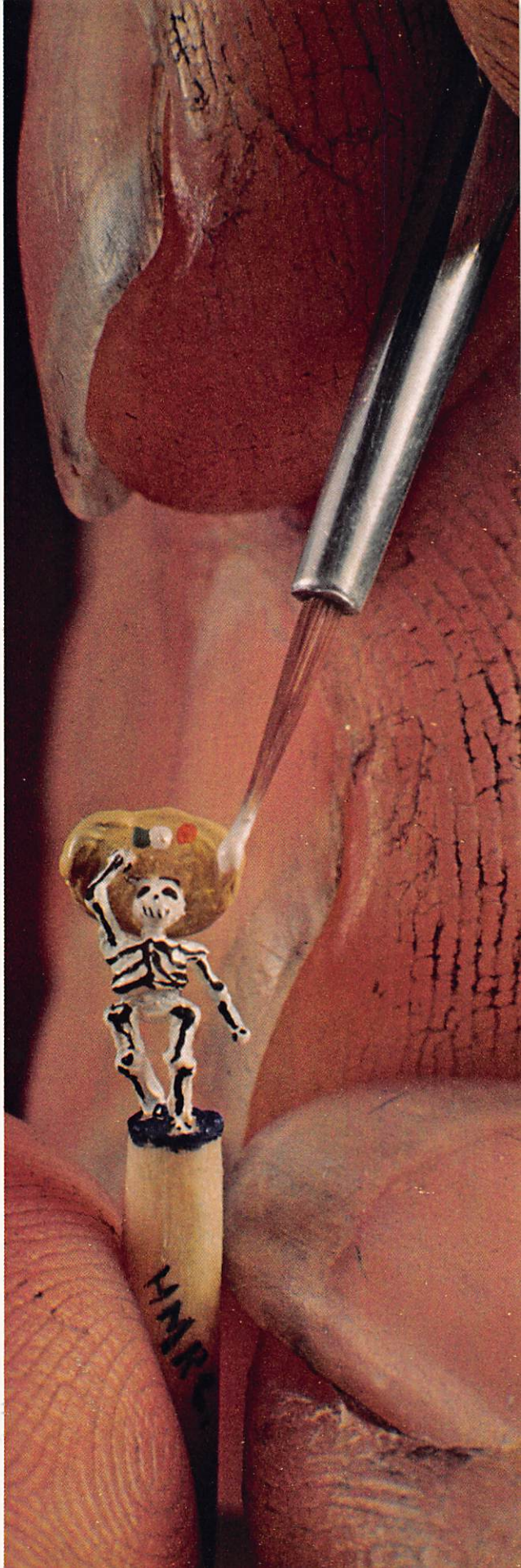
their yards weaving, one end of a belt loom tied around the waist, the other fastened to a tree. This pre-Hispanic system of weaving is still found throughout much of Mexico (pages 654-5). Swift fingers move the shuttle back and forth, controlling the white cotton threads to create a *quechquemitl,* the cape-like garment of Aztec goddesses, worn today by Nahua, Otomí, and other groups. The weaver finishes the border in red woolen thread and then heavily embroiders the whole with abstract animals, flowers, and geometric patterns.

Implements Revered as Living Beings

As I watched, I recalled what Donald and Dorothy Cordry, American residents in Mexico and specialists on the subject, had told me. Spinning and weaving, they said, were closely tied to agriculture in ancient times. Not long ago the weaving sword, a length of hardwood that tightens the thread, was still used in fertility rites, and the craftsman's tools were offered food before work began. San Pablito women still treat their implements as honored beings, and their husbands respect the tree that gives bark for paper as a sentient living being.

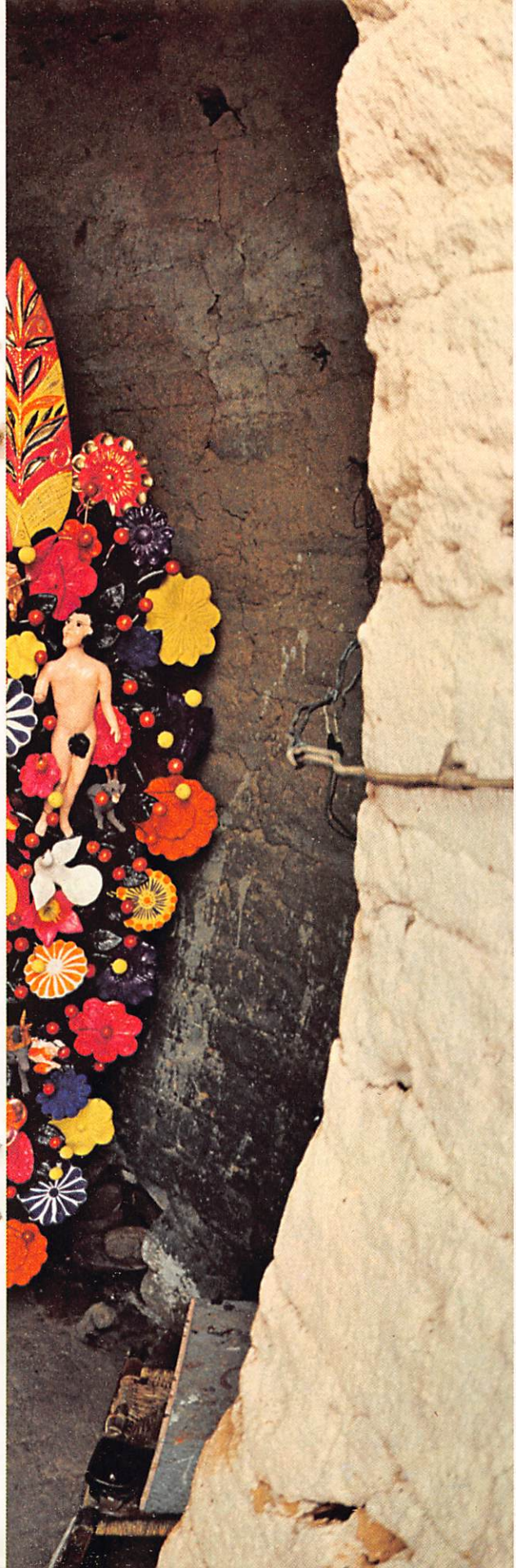
The San Pablito papermakers strip the bark off the wild fig tree, or *amate,* boil it in water and ashes, pound it, then spread it on wooden surfaces to dry. From this material magic figures are cut (page 657).

Some of the best customers for the bark paper are villagers of Xalitla and Ameyaltepec in Guerrero. In these pottery-making villages, the Indians paint the sheets with the same lively designs that grace their pots. Thus has been born a new and beautiful craft, unknown a generation ago.



Holy and humorous join forces in woodcraft. A carved mask trimmed with goat hair identifies a pascola *dancer (left), who communes with animals and jokes with Mayo Indians during feast days in Navojoa.*

Emiliano Zapata, a skeleton a quarter of an inch tall, wears Mexico's colors on his sombrero (right). In the tradition of portraying heroes as skeletons, lawyer Humberto Ricalde carves such figures from toothpicks for Bazar Sábado, a Mexico City crafts fair.



My late friend Don Hermelindo was not only an outstanding paper artisan but also a *curandero,* a medicine man who ensured fertile fields and other benefits. One day I joined him in the house of a patient, where he was drawing out the "evil winds" by cutting a series of large papers into abstract forms, on which he placed paper cutouts in human shapes. The ceremony also involved candles, lighted at each corner of the bed, the sprinkling of the room with *aguardiente*—homemade firewater—and chicken blood. At the end of the rite the entire paraphernalia (impregnated by then with the illness) was cast into a ravine.

Talking to the Mother Earth

In another ceremony, to bring fertility to the fields, Don Hermelindo strung his paper figures over the earth. Then, in the yard of his farmhouse, an all-night celebration followed, with loud music, food, and drink. A group of young girls chanted in the background. With all the noise around us, I wondered aloud to Don Hermelindo why the girls had to keep up their singsong. He looked at me sharply and answered, "But how will the earth know what we ask of it if they don't sing, if we don't talk to it?"

In Mexico City, in a setting of asphalt and skyscrapers, the artisan also holds lovingly to the tradition of making fantastic figures for both practical and symbolic ends. The Mexican world is peopled with delightful creatures of fantasy, a world of toys made not only for children but also for adults. Among them are Judas figures, which, since they represent evil, have to be destroyed. But this does not prevent adults from enjoying them during their brief span of life.

Bible in clay, an ornate decoration known as a Tree of Life tells the story of Adam and Eve. In Metepec, near Mexico City, Pedro Soteno paints leaves near the serpent after the piece is fired in the huge kiln. The ceramic forms probably evolved as potters shaped imaginative figures along a single theme and wired them to candelabra and censers. Such trees still adorn churches, but now also decorate hotels and offices.

They are made of papier-mâché and vary from a few inches to many feet tall. These ephemeral pieces, so painstakingly created to live only a few hours and die suddenly, as Judas did in Holy Week, have formed part of popular art for centuries.

I watched Pedro Linares weave magic with strips of newspaper and paste, in the papier-mâché manner. I marveled at the artist's ability to mold fantasy with the traditional Mexican sense of humor. Here were figures of death in the form of laughing skeletons, with wings and pink crowns. There was the familiar image of the exploiter, an elegantly dressed cardboard man with a thin twisted mustache and pinkish face. The range of subjects was as wide as their creator's imagination.

The artist first makes a ceramic mold or framework of bamboo, over which he stretches newspaper soaked in paste. He builds up many layers and leaves them to dry. He shapes the features while the paper is still wet. Finally, he paints the figure and adds special touches—a cotton fluff for hair, a coil spring to make the head bob jauntily.

Suspecting that the economy of making papier-mâché figures might be shaky, I

asked what the Linares family did between the "Judas times." "But there are no between times," I was told. "We are always busy. We make toys for Christmas and the Day of the Three Kings. From January to August we make toys for Mexico City markets. In September we make masks and helmets for the Independence holidays. In October we prepare for November 2, the Day of the Dead." As samples he showed me two grinning skeletons playing guitars and three dandies with death's-heads.

Candymakers are equally busy toward the end of October. They turn out skeletons

Seri Indians of Sonora traditionally paint not effigies but themselves. Basket maker Angelita Torres (below) applies natural pigments and lipstick in a tooth design.

Ephemeral art, meticulously created, instantly destroyed, is a hallowed tradition in Mexico. During Holy Week in Mexico City, a 20-inch papier-mâché Judas explodes in a burst of firecrackers (left).

in costumes of the Gay Nineties, or carefully groomed and seated in coffins. They also make large sugar skulls, displaying a wide selection of names written in candy letters across the forehead. All these jibes at death underscore the Mexican's determination to meet death with a smile.

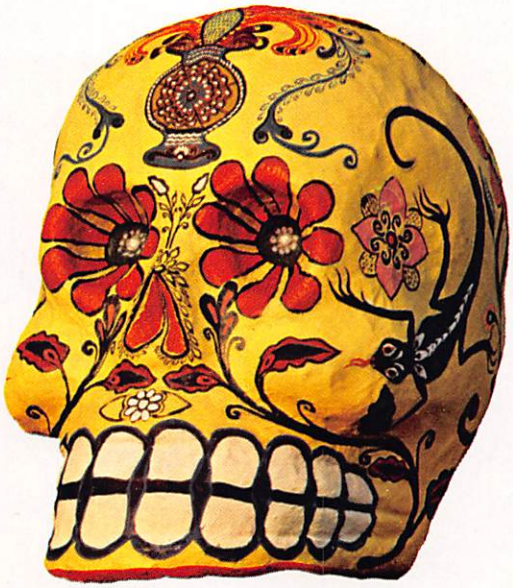
When Patience Becomes a Necessity

No less traditional but more lasting art is the lacquerwork of several communities. Outstanding among them are the towns of Olinalá in Guerrero, Chiapa de Corzo in Chiapas, and Uruapan in Michoacán.

The Ayala family in Olinalá has been famous for generations for lacquered trays, gourds, and chests of sweet-smelling *linaloe* wood. The chests are covered with delightful floral and animal patterns. A trademark is a black jaguar with red eyes.

The lacquer technique is reminiscent of pre-Hispanic cloisonné work, though some say the art was copied from pieces brought from China in colonial times. The wooden object first receives a coat of lacquer made of the oil of the *chía* seed (a kind of sage) mixed with a fine dust of crushed rock. This is applied by hand or with a paintbrush. The base color, in powdered form, is then put on a feathering brush and sprinkled over the oiled surface. The artist uses his hand and a smooth rock to rub the color in, the number of rubbings depending on the color chosen.

When the surface is dry, it is polished with a cotton rag to remove excess oil and add luster. The artist repeats the process for the second color, and before it sets, draws his design and cuts away the overlying color to reveal background. He uses a turkey quill with a thorn or steel point attached for the



Portray death with bravura, and fear disappears in a grin, say Mexicans who create special art for the Day of the Dead, November 2, when souls come to visit. Sculptors of papier-mâché paint life-size skulls with flower eyes (upper right). Bakers decorate loaves with saints and skulls for pan de muertos, *or bread of the dead (left), offerings left at graveside and on family altars. Skeletons rise from sugar coffins and marzipan graves to read and relax (right).*

incisions, sweeping away excess paint with the feathered end. After the final coat dries, it is polished. To attain proper luster, the artist may polish his work for days.

Plastic Toys Lose a Contest

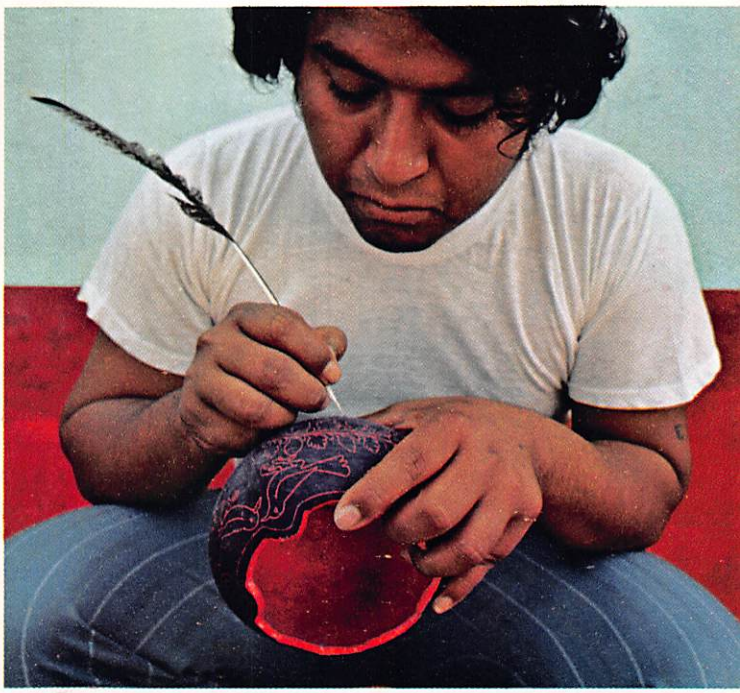
Mexico has been increasingly overrun by a host of plastic, rubber, and metal objects filling up the marketplaces, all lacking the magical quality of the handmade pieces. For the past two or three decades, artists, anthropologists, and government agencies have been trying to counteract this sterilizing tendency. One of the government agencies that encourages fine crafts is FONART, committed to the distribution of the work of rural artisans. Another is the museum shop of the Museo Nacional de Artes e Industrias Populares, on the Avenida Juárez in Mexico City.

The museum shop is directed by María Teresa Pomar, who is quite sanguine about the future of Mexico's popular arts.

"I believe we can count on the good taste of the masses," she said. "The villagers are less taken in by plastic objects than most people think. Some years ago a thousand wooden toys handcrafted in Guanajuato were offered for sale at a fair in Michoacán, side by side with plastic toys. Well, there were more customers for the wooden toys than for their plastic competitors!

"The awareness among the people of the utility and beauty of their handicrafts is still so strong," Señora Pomar told me, "that the villagers remain the best customers for Mexico's handcrafted wares, despite the export of several million dollars' worth each year. Don't you agree that this is a good reason for optimism?"

As I left the museum, a child toddled toward me on the sidewalk, embracing a big wooden rattle, perhaps bought in the museum shop. The sight drove from my head the worrisome vision of once fine Mexican craftsmen indifferently punching buttons and glancing yearningly at the factory clock on the wall. That child's captivating rattle suddenly took me back to the village of Ocumicho and the creative anxieties and joys and hymn singing of Don Miguel, the wax worker, and Doña Albina, whistle maker extraordinary. The child with his handmade toy on the big city's sidewalk made me feel certain that tradition is still alive and has a vigorous future in Mexico. □

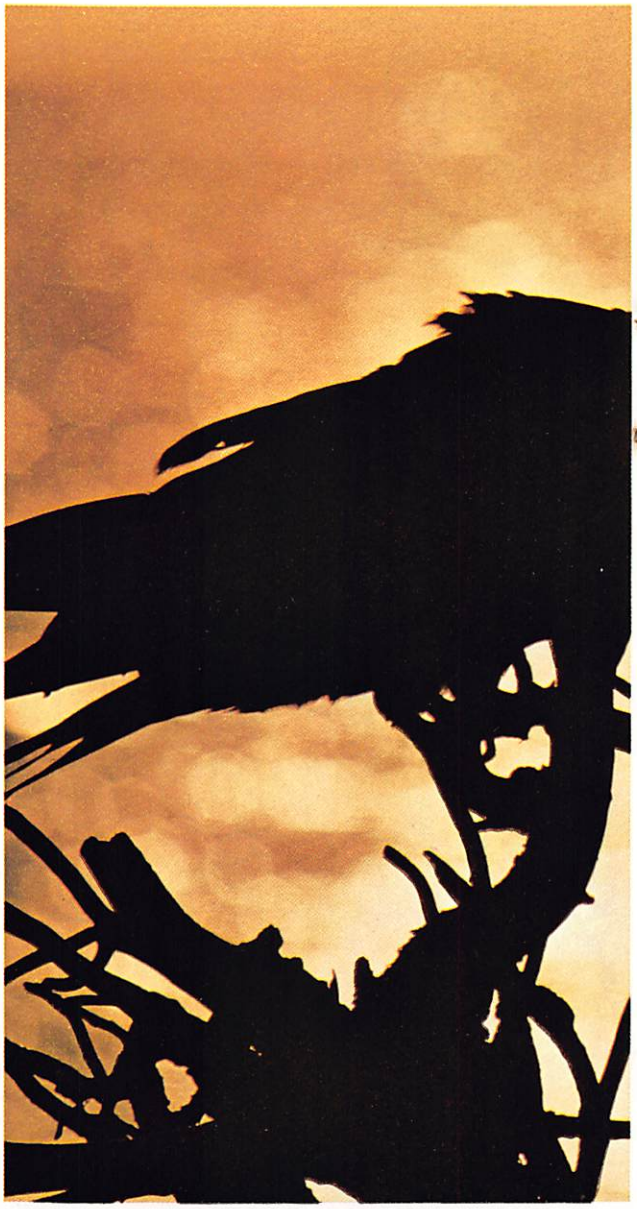


Wonderworld of nature emerges in an elegant lacquered tray (left), produced in the mountain village of Olinalá. A member of a lacquer-working family there, Dámaso Ayala transforms a jícara, *or gourd, into an ornate bowl by repeatedly rubbing it with oil, earth, and pigment, and incising the design with a thorn in a turkey quill (right). Sahagún, a Spanish chronicler, described a gleaming array of lacquered jícaras in Aztec markets. Since then, Oriental motifs have shown up in Mexican lacquer, suggesting the influence of luxury items brought from China to Acapulco for 250 years by Spanish galleons. Today, tourist interest helps revive such crafts.*

Hawaii's Far-flung Wildlife Paradise

By JOHN L. ELIOT
NATIONAL GEOGRAPHIC STAFF

Photographs by
JONATHAN BLAIR



In a sunset showdown, greater frigatebirds squabble for roosting room on a 17-acre sliver of the Northwestern Hawaiian Islands, or Leewards, as they have been popularly called since sailing days. Here, one of America's most unusual wildlife sanctuaries grants footholds of life to millions of seabirds as well as to a rare collection of indigenous land birds, seals, and turtles.

THE DIN IS INCREDIBLE, the sight unforgettable. Like an inrushing tide, the birds materialize from the horizon and sweep by the tens of thousands over the beach. Headed for nests with food for their young, they darken the dying sun in a shrieking whirlwind. Their numbers seem endless. Their island home is minuscule. Yet somehow, somewhere, they all find a niche.

Again and again I watched such scenes unfold in Hawaii's backyard, still known as the Leeward Islands. Politically part of Honolulu, they are flung like grains of sand across a thousand miles of ocean to the northwest of the main islands. Most of the chain is preserved as a rarely glimpsed treasure: the Hawaiian Islands National Wildlife Refuge. These volcanic fragments and coral atolls total less than three square miles—and wildlife competes for every foot.

The refuge, one of the world's important rookeries, is home to millions of seabirds, including petrels, shearwaters, terns, boobies, frigatebirds, and albatrosses. It also harbors, in much smaller numbers, four

land birds found nowhere else, and guards breeding grounds of the rare Hawaiian monk seal as well as the nation's sole nesting colony of green turtles.

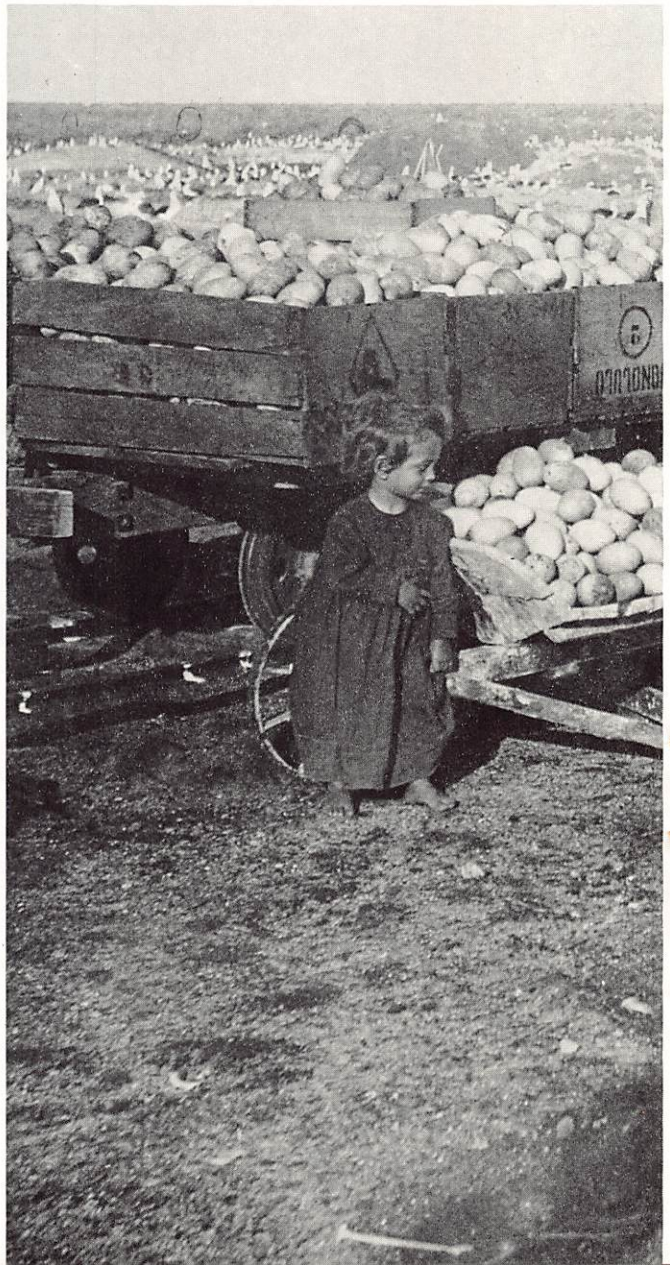
Aside from Coast Guardsmen at a small navigation station, no one may enter the refuge without permission from the U. S. Fish and Wildlife Service. Officials are keenly mindful of the islands' troubled past, highlighted by poachers who invaded in the early 1900's seeking feathers for the millinery trade. In 1909, responding to public outrage over the slaughter of hundreds of thousands of birds, President Theodore Roosevelt declared the islands a federal sanctuary. Yet a year later, 23 Japanese plume hunters were arrested in the islands with the wings of some 200,000 birds.

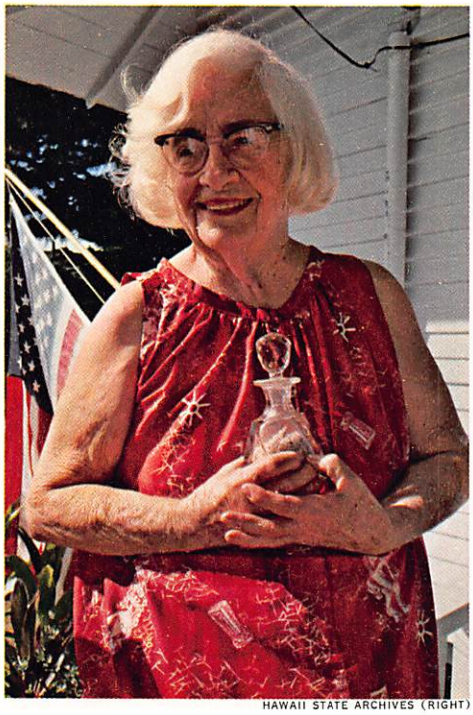
Today the creatures have little fear of man, I repeatedly and delightedly discovered—as long as I kept a low profile to blend with the flatness of their world. Once, prostrate at the water's edge, I was rewarded with an eye-to-eye inspection by a curious monk seal. Inches away, its eyes brimmed with a liquid innocence that haunts me still.

UP TO THEIR EARS in albatross eggs, youngsters and a worker display evidence of Laysan Island's teeming birdlife in 1906 (**below, right**). An entrepreneur who mined the Laysan guano for fertilizer harvested the eggs in the hope of selling them to companies that used albumen in making photographic paper.

One of his five children born on the island was Tillie Laysan Schlemmer, second from left, nicknamed "Birdie." Outside her Honolulu home today (**below**) she recounts a disaster: "I wanted a pet; that was one reason Dad brought the rabbits." The proliferating pests destroyed the birds' habitat, and as a result three endemic varieties—the Laysan millerbird, rail, and honeycreeper—became extinct.

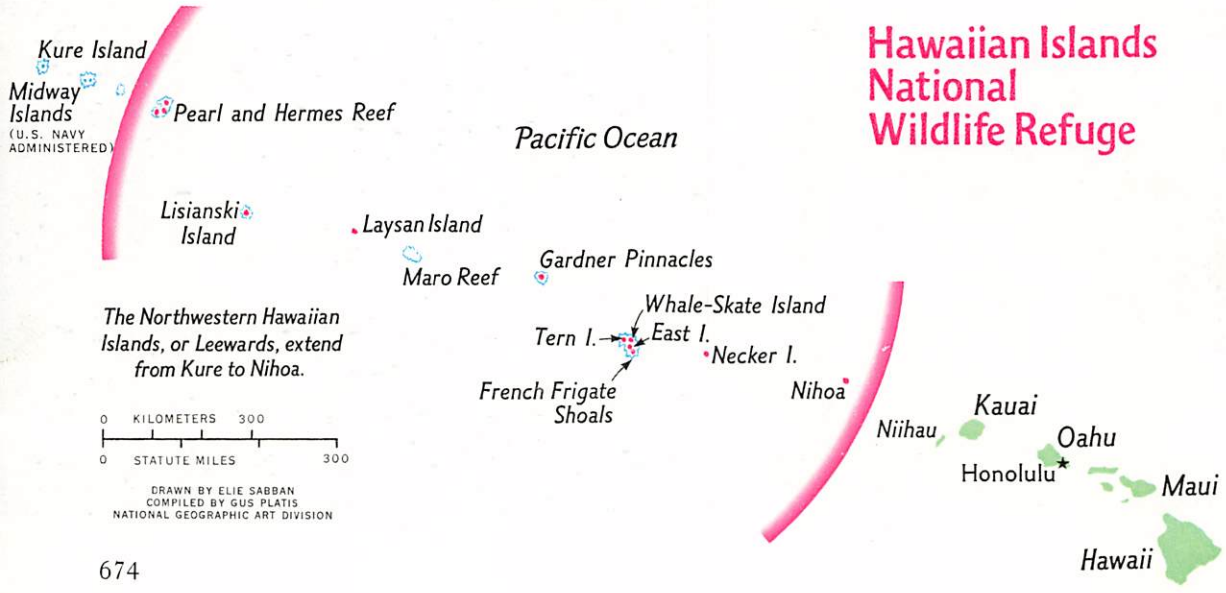
In 1923 an expedition directed by ornithologist Alexander Wetmore, now a Trustee Emeritus of the National Geographic Society, exterminated the rabbits. Vegetation recovered, and the 1.5-square-mile island (**above, far right**) today is home to some six million birds, including an estimated 250 Laysan teals. Perched on a rock, one tucks up a leg as in a ballet (**above, right**).

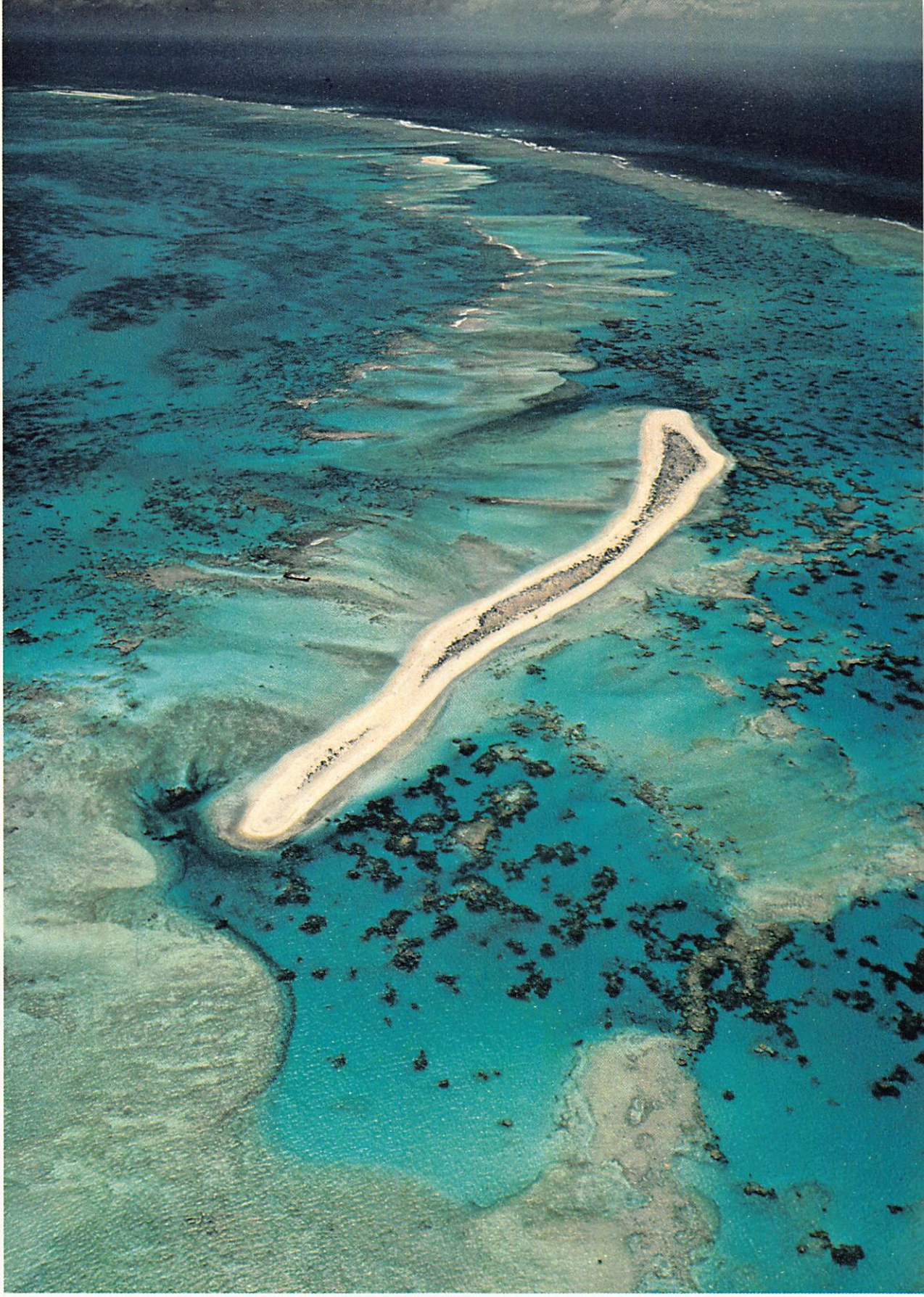




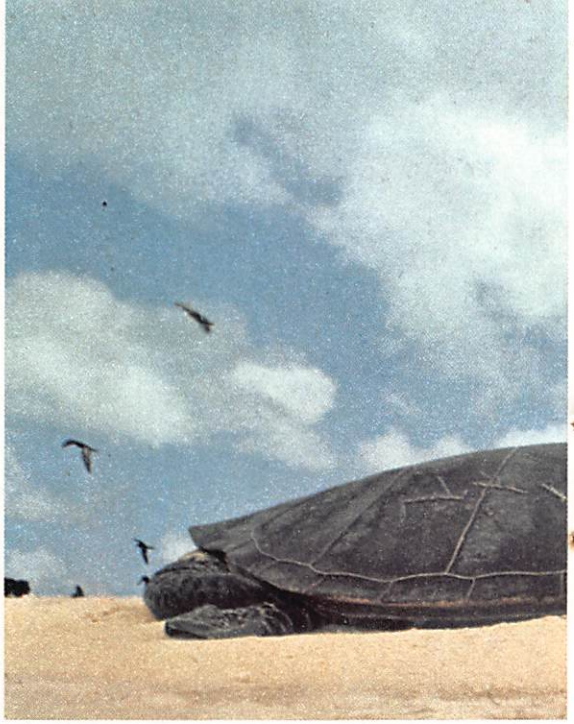
HAWAII STATE ARCHIVES (RIGHT)

EXQUISITE NECKLACE of French Frigate Shoals features Whale-Skate Island (**right**), one of the atoll's 13 islets. The western Leewards, perhaps 25 million years old, were the first Hawaiian islands to rise from the ocean floor. Most of the chain has been whittled flat by the sea, but a few volcanic chips remain, such as Nihoa (**above**), easternmost of the refuge islands (**map**). Its avian life includes Nihoa millerbirds and finches, the latter close relatives of the Laysan finch (**left**), another refuge native.





REVVING UP nearly mature wings, a juvenile black-footed albatross reaches for the sky, while a green turtle soaks up the sun (**right**). A second species, the Laysan albatross, is more abundant in the refuge, perhaps a million strong. Waddlers on land, both species when airborne sweep the miles aside on wings seven feet across. Parents provide squid for their chicks for about six months; then the adults head for the open sea. The offspring must master flight and fishing skills or starve. Another menace: sharks (**below**) that sometimes vacuum the surface for fledglings resting between test flights.



FLIP NICKLIN (ABOVE)

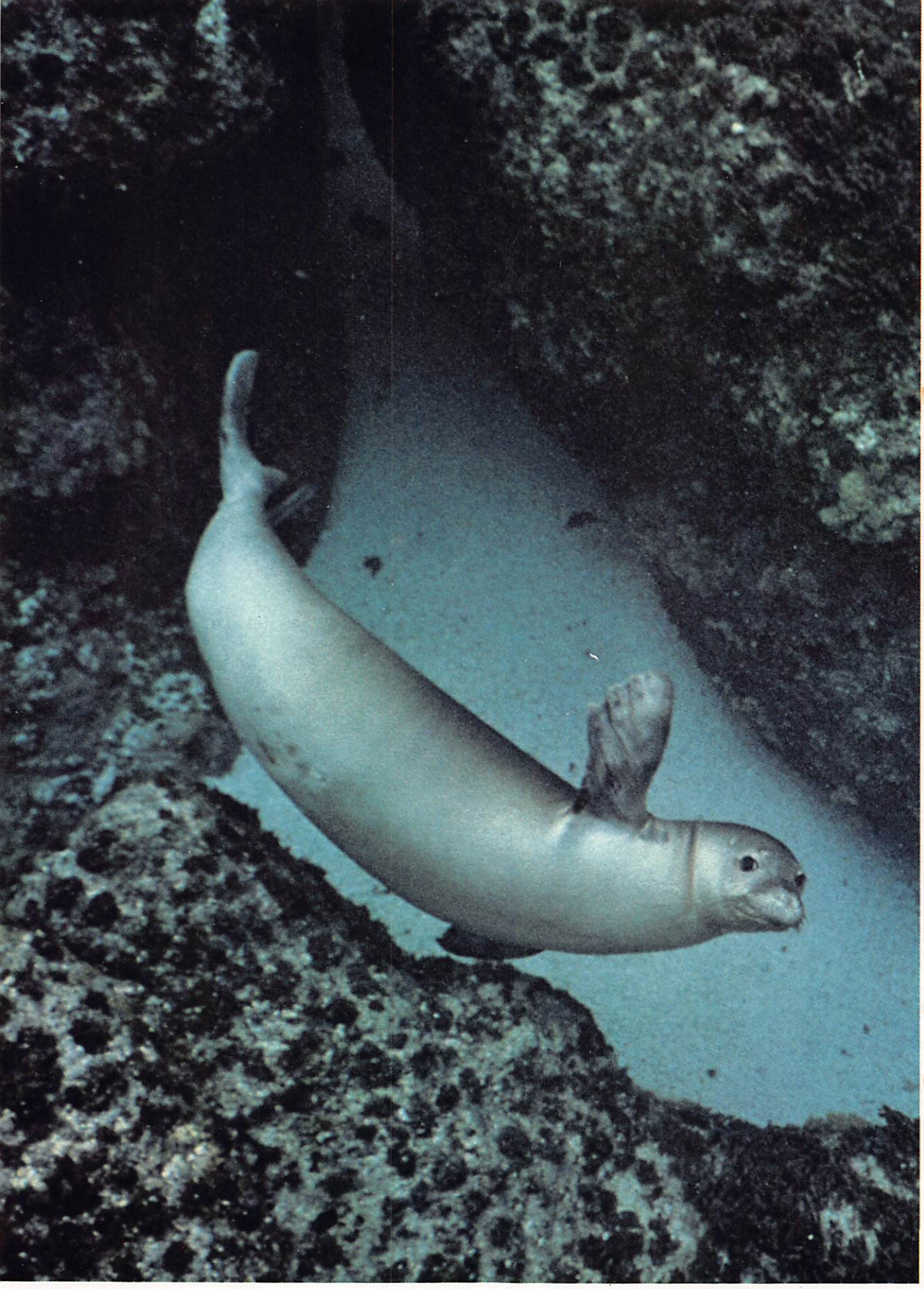
LIKE A LIVING VALENTINE, a male greater frigatebird inflates his gular pouch (**left**). The display attracts females and continues as males share incubation of the single egg with their mates.

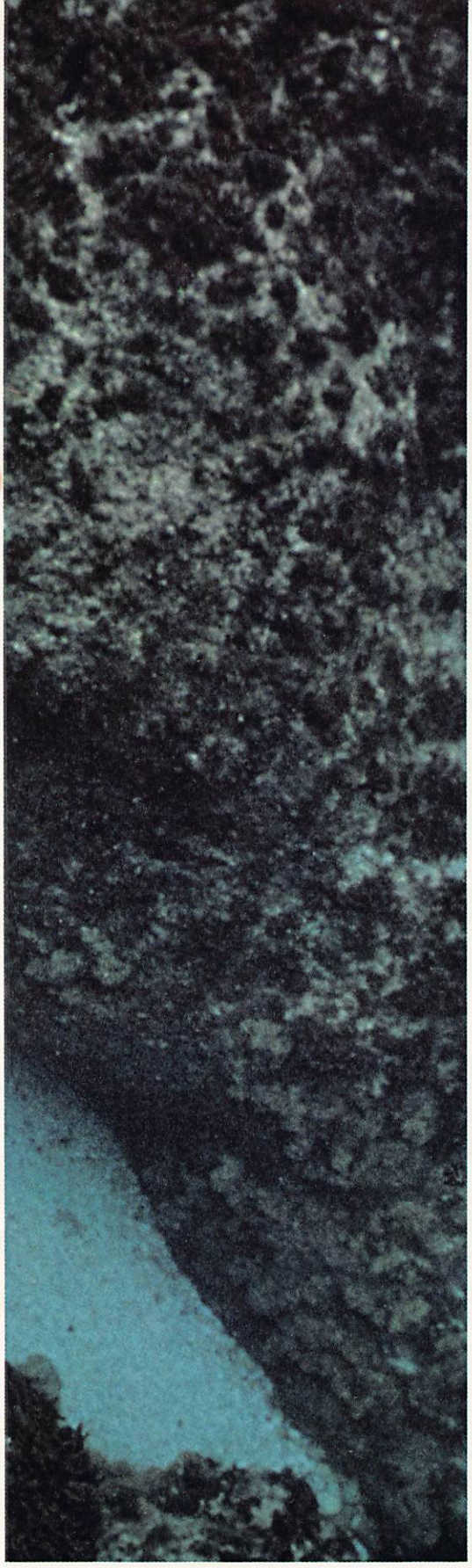
Voracious predator, the frigatebird aggressively lives up to a pair of nicknames: man-o'-war bird and *'iwa,* or thief, in Hawaiian. While they can do their own fishing, frigatebirds prefer to let others do it for them. Late in the day, when seabirds return to the islands laden with food for their chicks, the frigatebirds hang suspended in the wind, waiting. Masters of maneuverability, they waylay the incoming parents and harass them mercilessly until they drop their catch. The pirates often

nab the booty in midair. They also steal feathered meals, as a sooty tern chick learns—too late—after a diving frigatebird has snatched it from its nest (**above**). Even their own nestlings (**left**) can be fair game. Ornithologist John Sincock, a veteran of the Leewards, tells a startling tale: "I've seen a frigatebird leave its nest, make a 180-degree turn, come back, and devour its own chick."

Roar of an impostor raises a blizzard of sooty terns, as a DC-3 takes off after a welcome delivery of mail and supplies to 20 Coast Guardsmen on Tern Island.

Their loran station, built on the site of a Navy landing field used during World War II, broadcasts signals to ships and airplanes to help them plot their positions.





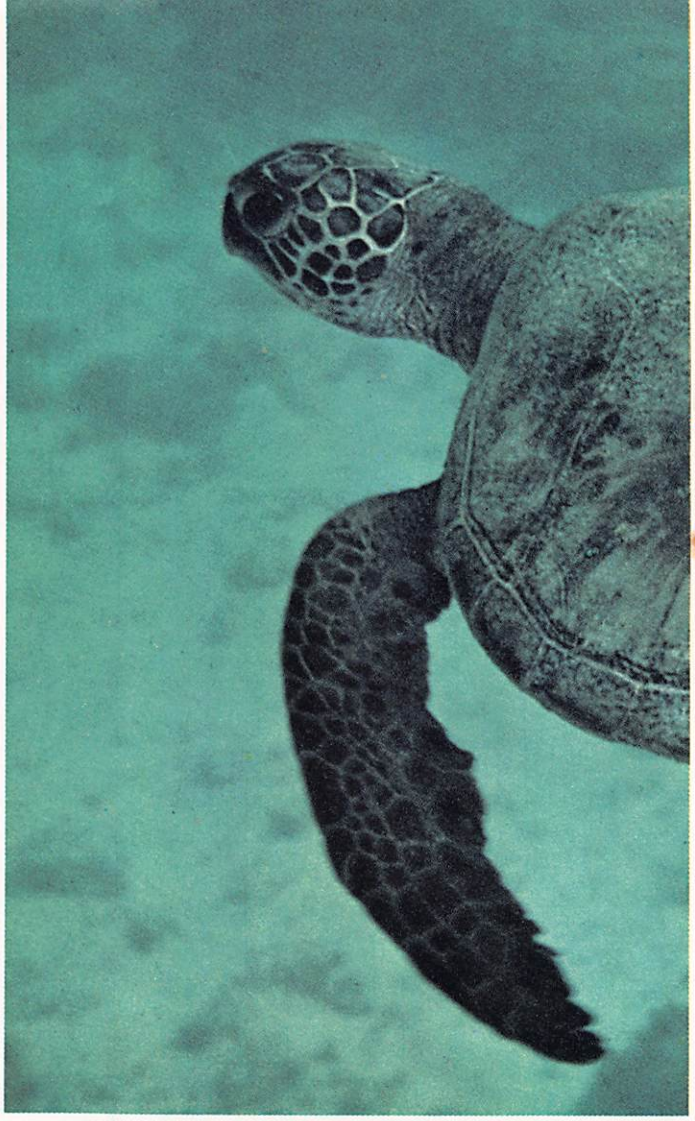
EMERGING from its haven amid submerged coral heads, an adolescent Hawaiian monk seal (**left**) casts a curious glance at photographer Blair. Perhaps maimed by a shark, another young seal (**top**) still has a fair chance to survive, with luck and the use of its uninjured flippers.

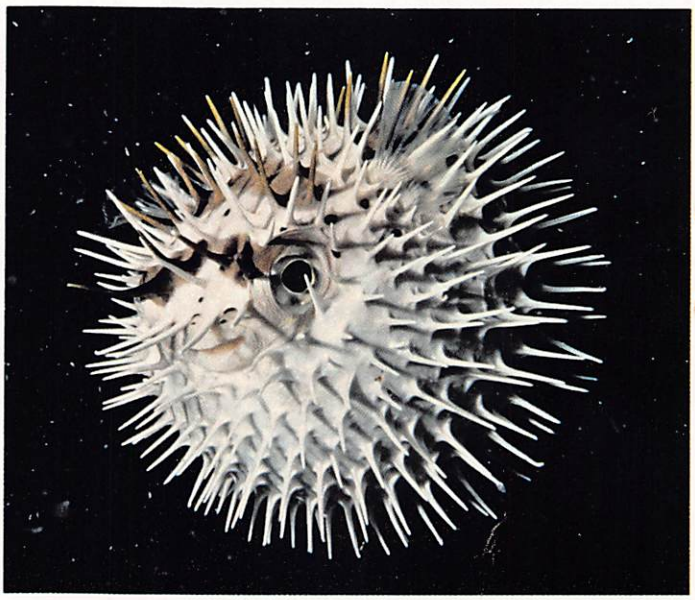
Named for a cowl-like fold of skin in their necks, the world's three varieties of monk seals once were plentiful. All were widely hunted, and ultimately abandoned most of their breeding grounds before man's expanding presence. In the refuge about a thousand Hawaiian monk seals—classed as an endangered species—keep the local population alive. On Laysan Island one dozes on a sandy pillow (**above**) near the remains of a Japanese fishing trawler that ran aground in 1969.

CLEANING SCRAPS from a moving table, a pair of convict tang nibble algae from a green turtle (**right**). Throughout the world, these turtles and their cousins have long been prized for soup, steak, eggs, and leather. While a few green turtles nest along Florida's east coast, the only true colony left in the U. S. finds haven in French Frigate Shoals. There females pit the sand with simple, but carefully constructed, nests. About 1,500 adult turtles roam the Leewards' waters.

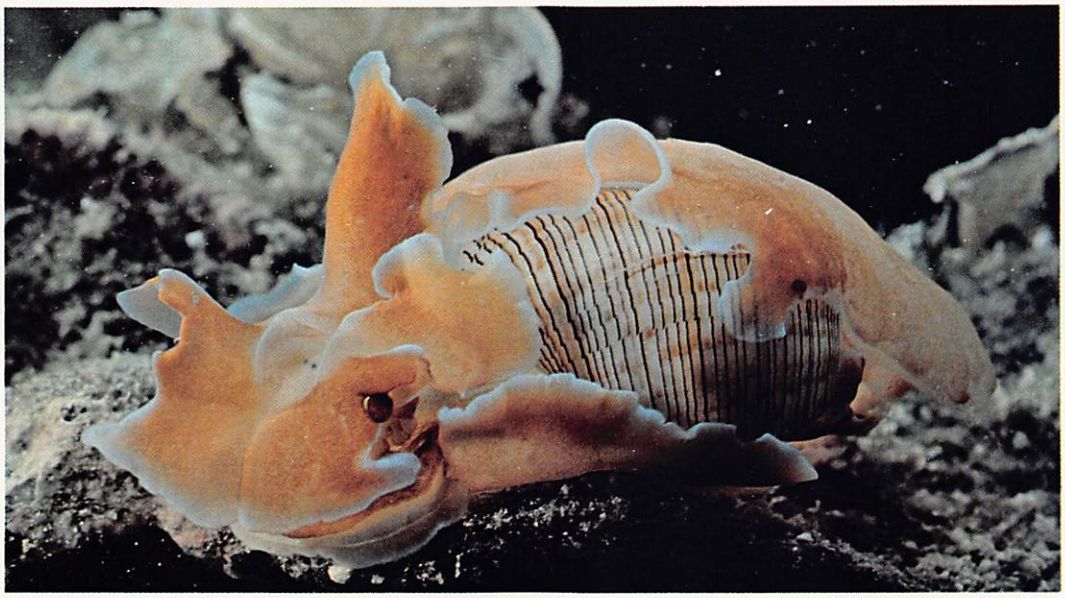
Another undersea denizen, a porcupine fish (**below, right**) inflates into a spiky spheroid to thwart predators. A chiffonlike mollusk, *Hydatina physis* (**far right**), fans out from its bubble shell.

Because the state and federal governments both claim jurisdiction over some offshore areas of the refuge, the status of its marine life remains an open question. Hawaii's fishermen want permission to work the islands' surrounding waters. A joint study by the state, U. S. Fish and Wildlife Service, and the National Marine Fisheries Service is under way to determine whether the refuge's fish can support both a commercial venture and the seabirds and seals that feed on them.





NATIONAL GEOGRAPHIC PHOTOGRAPHER BATES LITTLEHALES (ABOVE); FLIP NICKLIN (LOWER LEFT)



DELICATE AS A DREAM, a fairy tern hovers in flight. For these birds, homemaking is easy: They build no nest. Females often lay their single egg in precarious nurseries. On Tern Island a valve handle at the Coast Guard station is enough for one mother (**top right**). After a month her egg hatches. Oversize feet will help the hours-old chick

JOHN L. ELIOT

(**middle**) cling to its rusty bed. Soon both parents begin combing the sea in a nonstop shuttle for squid and fish (**bottom**). Chicks may gulp nearly half their weight each day.

AFTER A SQUALL deluged its community, a sooty tern stares at a drowned egg (**above**). The terns' choice of nesting sites in low, sandy areas leaves them vulnerable to such floods. But the disasters also serve as a natural form of population control for one of the most abundant birds in the world; some breeding colonies exceed a million members. "Their cries fill the air long before they can be seen . . . all night they circle and scream," wrote one ornithologist.

Another tern, the black noddy, usually chooses sites on higher ground. The elaborate nests of the noddy fill one of the refuge's few large trees, a beach heliotrope (**facing page**).

WHOPPING MOUTHFUL is met head-on by an immature blue-faced booby (**left**). Pleading for a meal, a red-footed booby chick smothers its parent with a hungry hug and clacks its bill against the adult's (**above**).

To ensure protection for the Leeward's wildlife, most of the islands and their surrounding reefs and shoals have been proposed by Congress as part of the National Wilderness Preservation System. Such concern reflects the plea of a Coast Guardsman who worked at a station, abandoned in 1952, on East Island in French Frigate Shoals. A tall wooden pole rises from the site like a lingering salute. On it, inside a white box, he left a message:

"Walk softly. Walk softly, stranger. The land on which you stand is Holy ground . . . a place of unspoiled beauty, colored by The Hand of God. And you who stand upon this land will someday too remember sun-washed sands and quiet days, and moments crystallized in time. Walk softly, stranger, for you stand on Holy ground." □

There's More to Nashville than Music

By MICHAEL KERNAN
Photographs by JODI COBB
NATIONAL GEOGRAPHIC PHOTOGRAPHER

An elder statesman of Nashville's best-known institution, Hank Snow awaits his cue backstage at the Grand Ole Opry. A regular for 28 years on the venerable hoedown, the Canadian-born singer is proof that the countrified sounds emanating from Tennessee's capital know no regional boundaries. Though a thousand local signs remind growing hordes of tourists that this is country music's capital as well, Nashville has yet another face. As one of the South's great education centers, with an abundance of classical architecture, the city has long been known as the "Athens of the South."

"I LOOK OUT THIS WINDOW, and there's the courthouse parking lot," mused Mayor Richard Fulton. "But that's not what I see."

We were sitting in his conference room surrounded by paintings of Tennessee countryside. A striking man with a big handshake and a straight, steady glance, he is Nashville to the core (page 694). He was born here, on the "other" side of the river, the east side, where the working people live. At 51, he still goes to the same Methodist church his mother took him to as a baby.

"What I see," he said, "is the Nashville Tent and Awning Company. It was right over there. I worked there afternoons after high school. Folding tarpaulins."

Before that, he delivered orders on his bike for a drugstore across from his house. He caught my eye and chuckled. "In those days you could order a pack of gum and five loose cigarettes, and we'd deliver." Years later he and his brother bought that store, and then another, and then a variety store. That was the beginning.

"Dick, what is so special about Nashville?" I asked. "You were a Congressman in Washington for six full terms, and still you commuted home every weekend. Why?"

He swung to the window again. Along the winding Cumberland River a row of dark old warehouses glowered in the sun. On a hill to the west another tall office building was going up. Cranes seem to be part of the Nashville skyline these days. "I don't know," he murmured. "It's just home."

"They tell me you've recorded a song. 'Poor Little Paperboy,' is that it?"

"Yeah." He snorted. "The poor little paperboy was me. I recorded it and went on the Grand Ole Opry a couple of times. TV too. Only made about $1,200. Now they want me to use it for a theme song when I run for governor next fall."

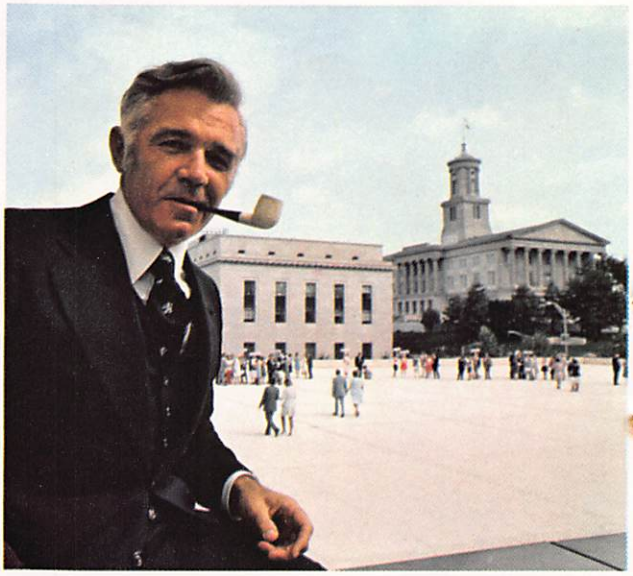
No wonder they call Nashville "Music City, U.S.A." Everybody gets into the act. On a sidewalk on Music Row one steamy August afternoon I had spotted some words scrawled into the concrete. "Those who hear not the music think the dancers mad."

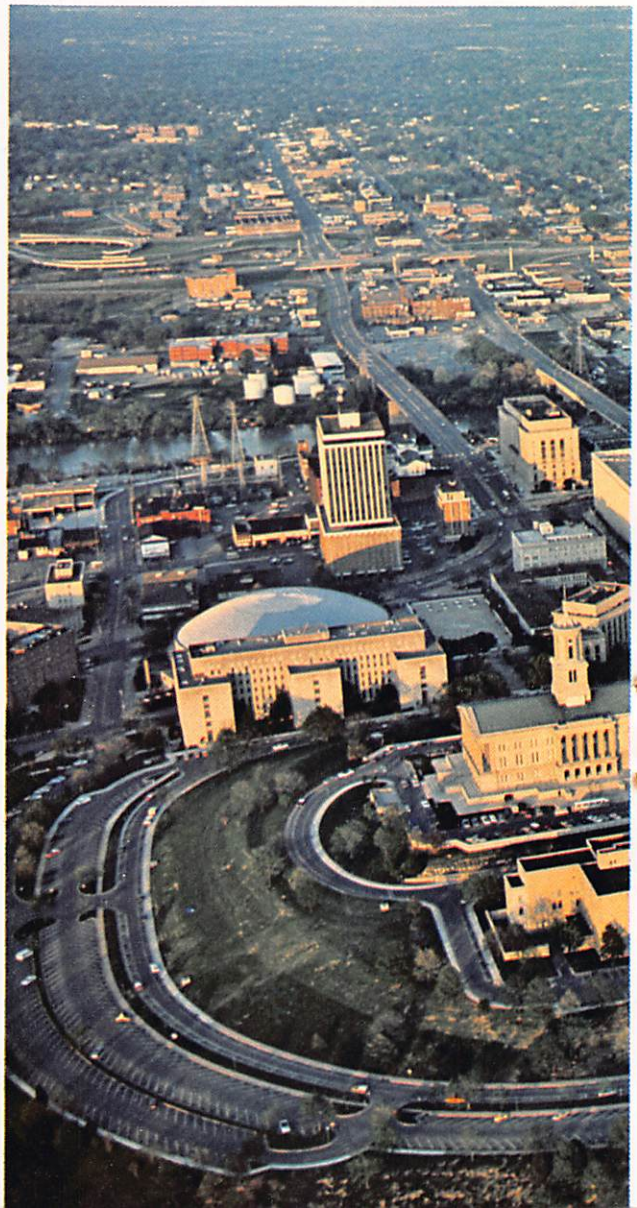
Amazing: For all you hear about the 300-million-dollar music business here, it's still only the third largest enterprise in town, after publishing and insurance.

There's been country music in Nashville as long as there's been country, but it took the Grand Ole Opry to bring it together. One night in 1927 master of ceremonies George Hay was introducing the "WSM Barn Dance" on that station, owned by a locally based insurance firm, National Life and Accident. He quipped: "For the past hour we have been listening to music taken largely from Grand Opera, but from now on we will present the Grand Ole Opry."

The name stuck. The Opry flourished. People flocked to it. Soon the Opry moved to a larger and then a larger place, winding up in a barnlike downtown tabernacle, Ryman Auditorium (page 701). For a generation the Opry broadcast from Ryman. In 1974 it moved out of the downtown area to a new 4,400-seat Opry House built by National Life, now part of a giant holding company. A six-foot circle from the old stage was sawed out and inserted in the new one.

The Opry is rooted in nostalgia. It yearns for the past, a past that maybe never really was: country livin'; country cookin'; sly hayseed humor; pigtails, freckles, and blacked-out front teeth; and the Wild West myth, transported east with the vaguely western themes of its songs.





Millions Tuned In to Grand Ole Opry

Long before Elvis Presley and Johnny Cash came on the scene, Nashville beat time to plunkers and pickers and jug bands.

Veteran record producer Joe Allison chatted with me about the Opry over lunch one day in a local hangout, Hap Towne's out-of-the-way cafeteria. It is the kind of place where you will see a producer in a business suit, a hippie in an Indian headband, and a country boy whose socks don't match, all at the same table.

Allison recalled that, long before television, millions of Americans had picked up the 50,000-watt signal of WSM on their radios and come to know the Opry regulars.

"Roy Acuff was a god in those days," he said. "People would come in to see the Opry, and they'd push right up to the stage, not realizing they were on the air, and call out, 'Which one's Roy?' You could hear them across 16 states."

Many stars long since have faded out, but a few survive through sheer character.

Nashville's bold skyline, towering above the Greek-columned State Capitol, announces one of the South's most prosperous cities (**below**). Mayor Richard Fulton (**left**) heads its Metro government: an unusual tax-saving experiment approved by voters in 1963. A consolidation of jurisdictions in Davidson County, the metropolis holds nearly 500,000 people. Heroine of the 1960 Olympics, when she won three gold medals, runner Wilma Rudolph (**right**) is now a civic and state booster.

Sarah Cannon is one (page 700). Daughter of a lumber-firm owner, college educated, she came on hard times in the Depression. And then, after Sarah invented the character of Minnie Pearl, it was years before she could exploit it. In 1940, when she was 28, she was given a one-shot chance at the Opry and a fee of ten dollars. Opry officials feared that her bumpkin getup and her monologue about the folks at Grinder's Switch, a rural crossroads, would be taken as a put-down. But people warmed to her radiant sincerity, and hundreds of fan letters poured in. She was on her way.

Minnie Pearl's Star Shines Offstage, Too

"There really is a Grinder's Switch," Minnie told me. We sat in a makeup room at the Opry while her face was being touched up. People kept popping in to tell her they were almost ready for her, but she didn't let me feel hurried.

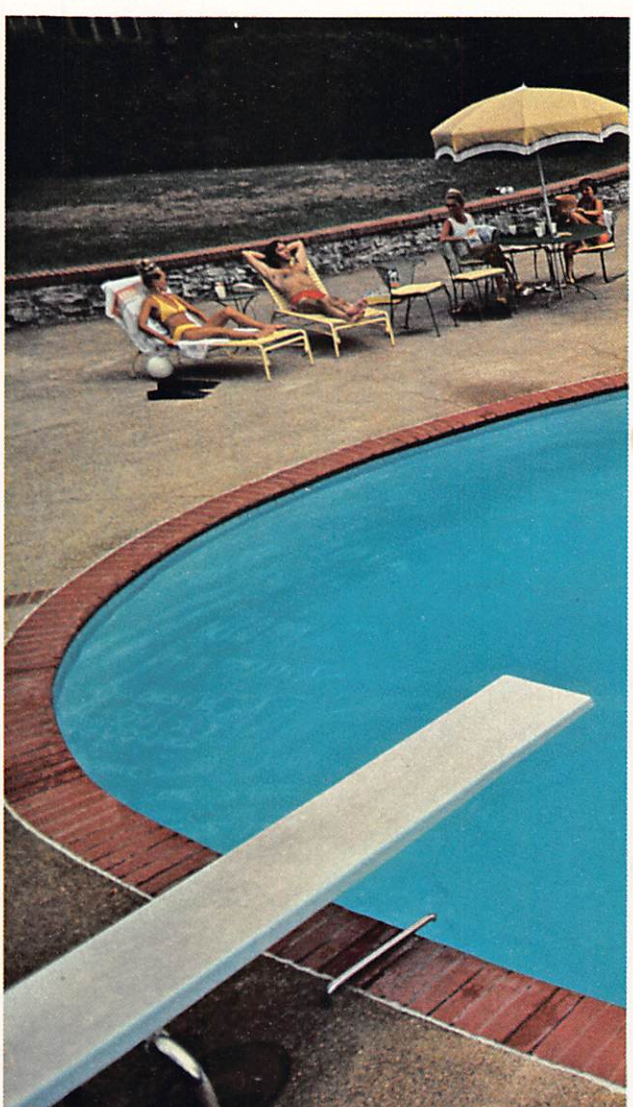
"Come on, we can talk backstage," she said, setting her famous hat just so. "Oh, yes, I've had several hats, but these are the same shoes. My lucky shoes."

A small girl jumped out at us in the corridor, her camera at the ready. "Stand right there, Minnie," she said unabashedly. "Now give me a big smile."

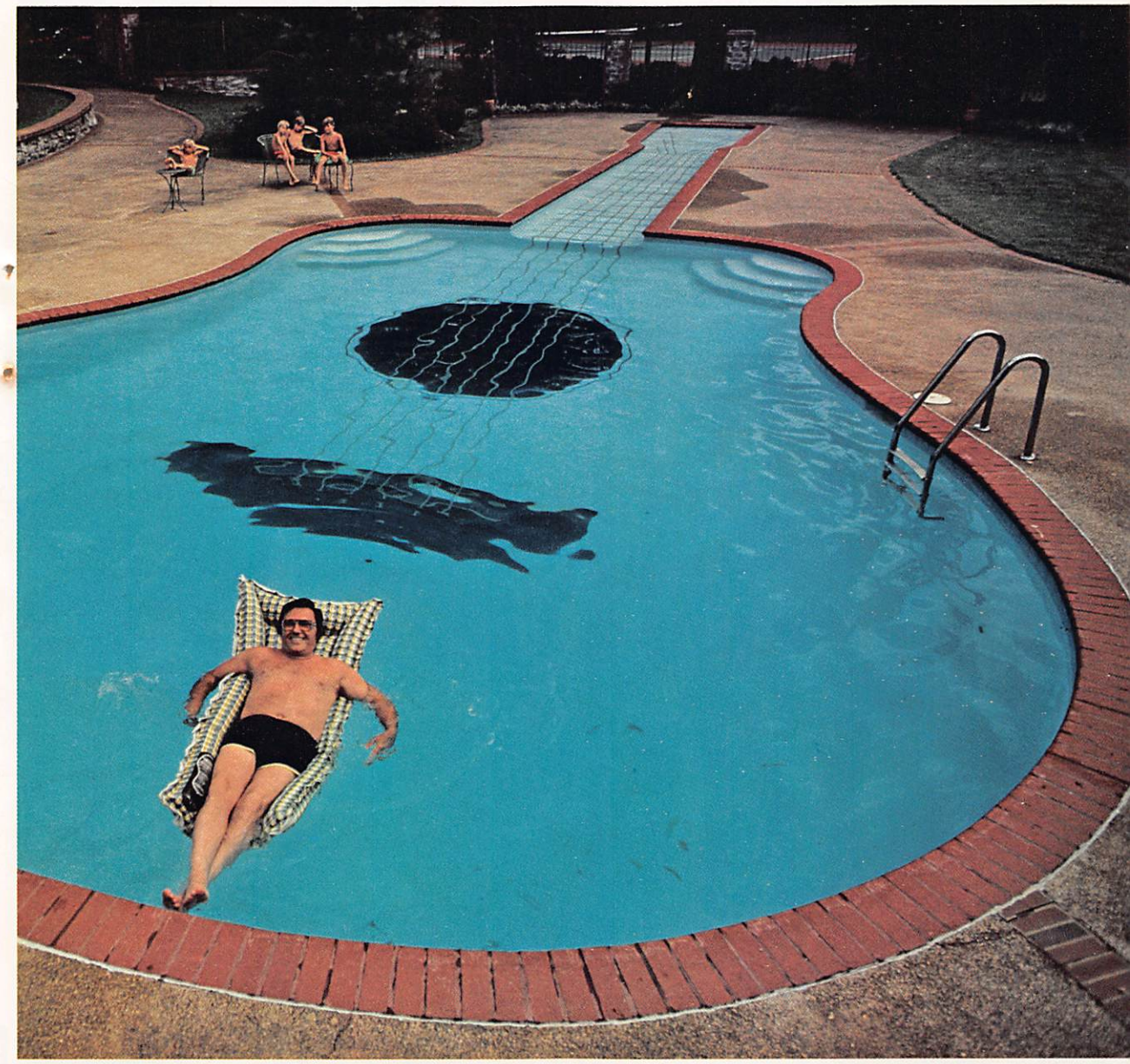
Obediently, Minnie smiled. "Who do you belong to?" she asked. "Aren't you the cutest thing!" She has no children of her own. "I wish I had your face," she said, leaning down to the girl. "I wouldn't have to work."

"What does Sarah Cannon think of Minnie Pearl?" I asked. A wistful smile: "She envies her. Minnie doesn't have any problems. She lives in a mythical world of fun and the verities." She paused. "There weren't any show-biz people in my family. It's been work; it's been 38 years of one-night stands. But I love it."

Minnie Pearl is an enduring Nashville landmark. That other landmark, the Opry, however, no longer dominates Nashville music. True, its new site stands beside a 35-million-dollar theme park called Opryland, U.S.A., close to the new Colonial Williamsburg-style Opryland Hotel. And the Opry fairly bristles with energetic young executives who talk of the bright future. But there is not so much a characteristic Nashville sound anymore as a Nashville scene.



"This is Hillbilly Hollywood," testified Webb Pierce (**above**) when the suburb of Oak Hill forced him to close his pool to tourists. Undaunted, the entrepreneurial country star is building a similar pool across from the Country Music Hall of Fame—and selling memberships to fans who wish to have their names inscribed around its sides. Though the view along downtown's Broadway (**right**) seems to confirm his judgment, Nashville's visitors can find more enduring landmarks, notably the Hermitage, home of President Andrew Jackson, and the Parthenon, a copy of the classical Greek temple.



SIGHTSEEING TOURS
See THE HOMES OF THE STARS
The GRAY LINE
501 BROAD
BOB
SCOTT SALES CO.
WHOLESALE ONLY
SOUVENIRS NOVELTIES JEW
29 HERMITAGE AVE
Nashville, Tenn.
PHONE
256-82

Much of the scene takes place on Music Row, a mixture of sleek modern buildings and ramshackle bungalows where most of the recording is done. "All kinds of music are coming out of here," said Frances Preston, who directs Broadcast Music, Inc. "Perry Como records here, and Carol Channing. Nashville now has a huge talent pool: musicians, songwriters, publishers, producers. And we have the best equipment anywhere. Why fly everyone to Hollywood when you've got it all right here? You can hear rock, blues, electronic stuff, gospel, bluegrass, classical—everything is recorded here. The American Federation of Musicians has 2,600 members in town."

The availability of talent also is expanding the television industry. Many entrepreneurs think that Nashville's entertainment future lies with TV. It's a long way from the old Grand Ole Opry.

Frontiersmen Settled at French Lick

It's also a long way from the Cumberland River, where Nashville began. Maybe the history of Nashville music can be a metaphor for the city itself, which once drew life from the river but over the years has moved ever farther from it.

It was a dreamer named Richard Henderson who conjured up Nashville just over two centuries ago. Hoping to open the fertile lands beyond the mountains, he chose two veteran settlers to lead his people west.

In the cold winter of 1779 James Robertson brought a group through Kentucky to the frozen river, and camped at the salt springs called French Lick. Another party, headed by John Donelson, arrived the following April. Fort Nashborough—a model of which stands by the river today—secured the settlement.

Other pioneers found their way over the mountains from North Carolina. Soon small farms spread out from the riverbanks, raising livestock and growing tobacco, corn, and wheat in the limy soil.

The farmers brought slaves with them, and one was given as a wedding present to his owner's daughter when she married and settled here in 1790. That slave became a skilled builder and started a dynasty. His great-grandson, architect William DeBerry McKissack, now heads a Nashville firm that has put up many Baptist and Methodist churches as well as important buildings at Meharry Medical College and others as far away as New York and Texas.

"We're a small building company," said the tall, gray-haired Howard University graduate. Then he twinkled. "But I guess we're the most visible, being black. We stand out like a sore thumb."

McKissack told me that many of the settlers who migrated from North Carolina educated their slaves to some degree. And the variety of crops they raised contrasted with the cotton economy, which required vast plantations.

"There wasn't so much fear here, because both races were educated, you know. If you had a few slaves, you could communicate with them. But if you had a lot, you had to keep them in their place. That's where the fear came in."

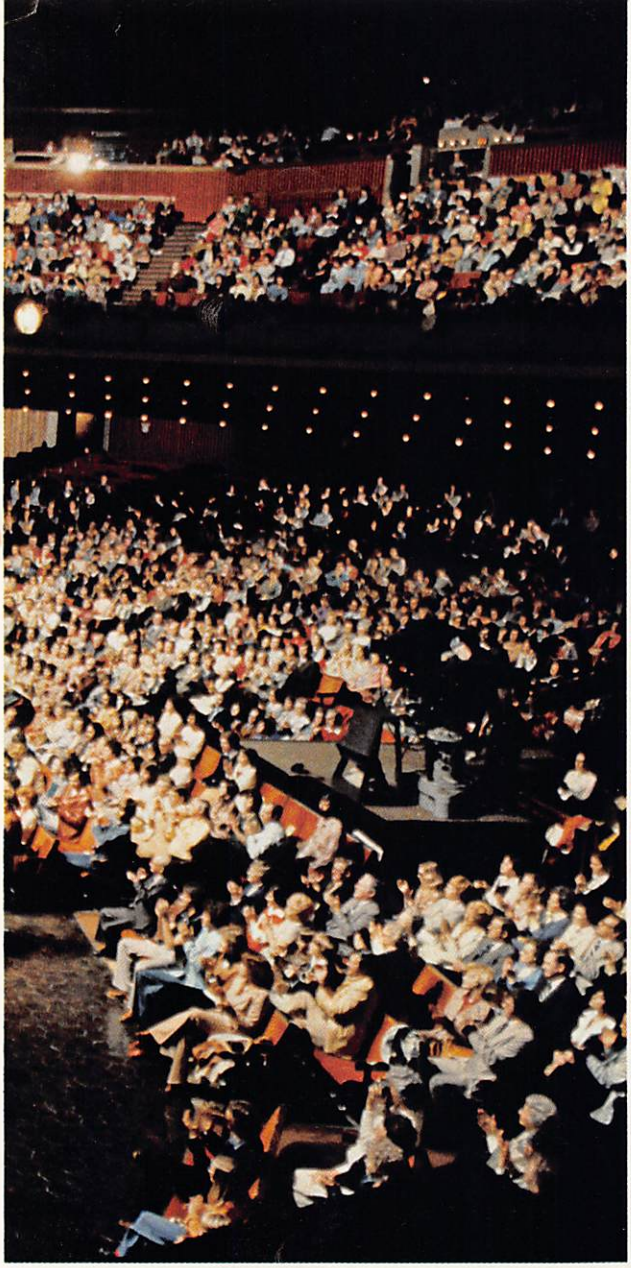
Confederates Suffered Devastating Defeat

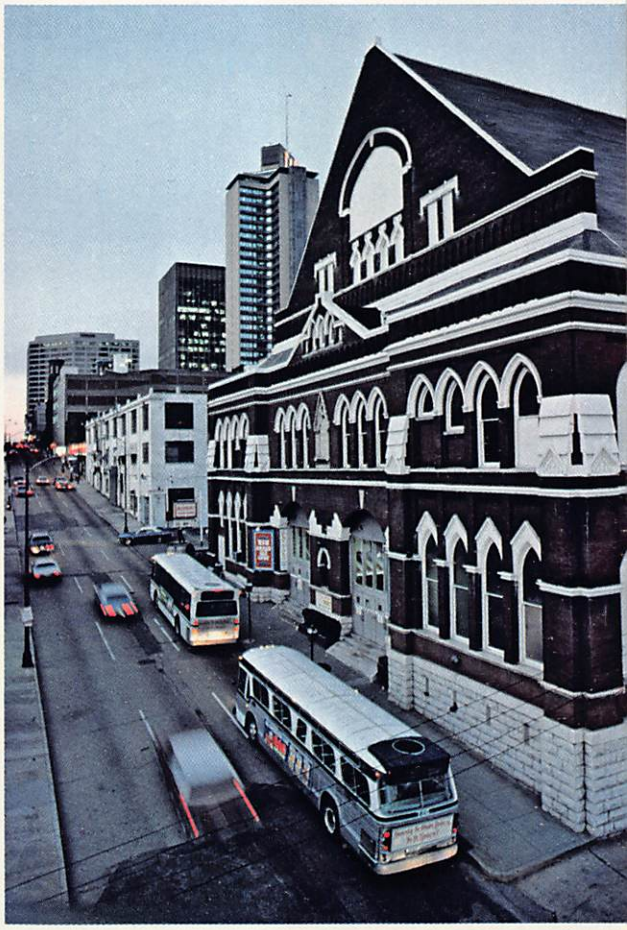
Slavery's downfall, the Civil War swirled through and around Nashville. Surrendered to the Union after the fall of Fort Donelson in 1862, the city was occupied by Federal forces for the rest of the war. But late in 1864 Confederate forces under Gen. John Bell Hood drove north through central Tennessee, hoping to cut off a Federal force, which foiled the attempt and entrenched at Franklin. Hood rashly sent 18,000 men across two open miles in a futile charge. More than 6,000 Southerners died.

Two weeks later the rest of Hood's valiant soldiers were defeated at Nashville, suffering what has been called the most complete Confederate defeat of the entire war.

As the 19th century accelerated to a close, this farming town and river port turned increasingly to the railroads. River traffic

Belting out joyful sounds on tour, Dolly Parton epitomizes the dream of many a country singer and songwriter: stardom in the pop-music market. Her country roots and following still intact, the honey-wigged soprano lives on a farm outside Nashville, where she arrived from the Great Smoky Mountains in 1964 with a cardboard suitcase full of songs.





In tune with all kinds of music, the new Grand Ole Opry House rings with applause as Ann-Margret takes a bow during a weeknight taping of an NBC television special. But Friday and Saturday nights are still pure country, when the nation's longest-running live radio show cranks out down-home fare over station WSM for fans as distant as Canada. A far cry from the Opry's former home, the old Ryman Auditorium (**above, right**), the new Opry House sits beside Opryland, U.S.A., a suburban theme park built by the National Life and Accident Insurance Company. With some of the country's most sophisticated broadcasting and taping facilities, the new Opry House is helping put Nashville on the map as a production center for national television.

At a special-education school, Opry favorite Minnie Pearl (**left**) accepts a bouquet from delighted young fans. One of Nashville's leading citizens, college educated and a former dramatics coach, Minnie Pearl is Mrs. Henry Cannon in real life. In 1936 she modeled her comic persona after a "country girl comin' to town for a little tradin' and flirtin'."

Provenance of well-bred horses and the well-to-do, Nashville's environs have known

thinned out significantly, leaving along the west bank a row of timeworn warehouses bearing the names of long-forgotten snuff manufacturers, meat processors, and cotton distributors.

But Nashville never has been one for being left behind: Energetic men of the new century created new enterprises, making clothes on the spot instead of shipping the cotton east, developing mineral resources and forest resources and—as wealth accumulated—the intellectual resources of the young population.

Gradually, often under church auspices,

bitter times as well. Here, near Franklin, 6,000 Confederates died in a Civil War battle.

a mighty network of 17 colleges and universities sprang up: Vanderbilt, an important influence in leadership all over the South; Fisk University, Meharry, and Tennessee State, focal points of black education; and religious and specialized schools.

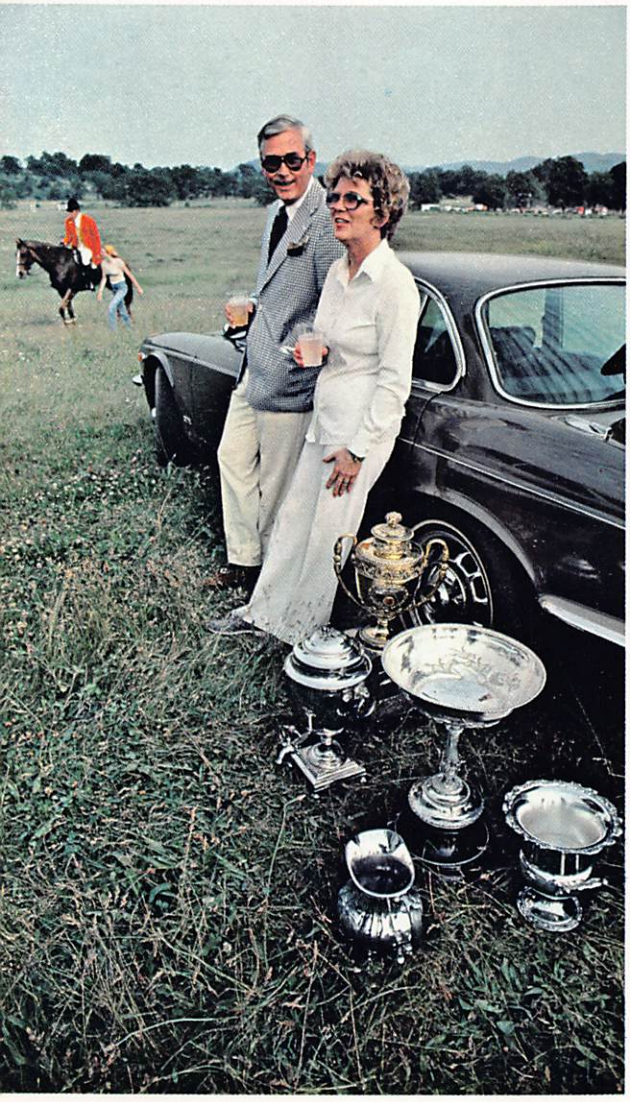
The city also is a medical mecca today. Surgeons conduct as many open-heart operations at St. Thomas Hospital—five or six a day—as at any place this side of Houston, and Nashville is one of the South's major centers for kidney dialysis.

It is also famous for its religious printing industry, the biggest in town.

A former journeyman printer from Ohio, Bob Yoke, took me through the United Methodist Publishing House. Nearly two hundred years old, it is the parent of Cokesbury, Abingdon, and Parthenon Press, and the most complete religious printing setup in the South.

"We're automating," Bob said as he led me through an astonishing nine-acre wilderness of huge cameras, presses, photo labs, hardcover manufacturing, gold-plating, and packaging. "Every working day we use nearly three freight carloads of paper and half a ton of printing ink. And some of our work is for outside publishing companies like Harper & Row."

That's just one publishing house. There are 11 major religious publishers here, many with their own printing facilities. About 700 churches in the area serve half a million people. Nashville is a city of spires, from the downtown streets to the outskirts bustling with new Nashvillians.



Population Boom Outruns Housing

Fast-talking Charlie Wells of Philhall Corp., one of Tennessee's leading residential developers, told me that people are moving into the Nashville area faster than houses can be built for them.

"A third of the families are from out of town," he said. "There's a lot of turnover. I tell you, this is a boomtown."

People who haven't the slightest interest in what they call "that hillbilly music" are moving to Nashville for countless reasons. They come to work in all sorts of businesses, from auto glass to industrial chemicals, from casket making to clinical thermometers, and especially insurance—seven insurance companies based here have combined assets totaling 3.6 billion dollars.

Attorney George Barrett has watched the good times come on. A member of an old Irish Nashville family, he fondly recalls taking the nickel trolley across the Shelby Avenue Bridge in the thirties. In those days, he will tell you, his grandfather was the town fumigator, whose political opponents were apt to find their houses quarantined for measles each Election Day.

We strolled the old streets one afternoon, and he pointed out some changes. "That's the Genesco plant, which used to be the Jarman shoe factory. It's part of a giant combine that produces shoes and clothing and who knows what else."

He munched on peanuts as we walked. "Sometimes I almost forget that Nashville is the state capital, there's so much else going

Patrician sports and graces score yet another Nashville tune. In Percy Warner Park (**left**) Mr. and Mrs. Jesse Henley, Jr., display trophies won in the Iroquois Steeplechase—a premier national jumping event. At the home of Mrs. Walter Sharp (**right**), who donated the Cheekwood estate to the city, guests savor music of the Blair String Quartet.

on." The capitol building's classical tower and Ionic columns, completed in 1855, have been dwarfed by new office buildings and the Performing Arts Center now under construction.

"Nashville used to be just government and transportation," Mr. Barrett went on. "Those were the only kinds of jobs you could get. Today the variety of businesses is amazing. I call it a 'son-in-law town.' Many businesses are still in local hands. The ruling clans have a way of absorbing outsiders."

Metro Helps Hold Down Taxes

Perhaps Nashville's biggest boost came from the people themselves in 1963, when they voted to expand the city's borders to cover all Davidson County. Called Metro, it eliminated duplication of city and county government services.

Only a few cities have tried the Metro concept; fewer still have made it work. But here it has held taxes down and in turn created jobs. Nashville's unemployment rate is 3.3 percent, about half the national rate.

Metro's success has helped attract vast projects like the billion-dollar MetroCenter, a cultural and business complex being scraped out of a former floodplain. This, along with a plan to renovate the waterfront as a fancy shopping center, should give Nashville a model downtown.

East of the river are the modest houses of working Nashville, a racially mixed area. The city's northern sections are dominated by blacks—who make up about a fifth of the population—while the homes of affluent and influential whites sprawl in the south and west.

Farther out spreads horse country, white-fence country, farm country (pages 702-703). The old red-brick town of Franklin is fast becoming a chic place to live. At the village of Mount Juliet, you can find concerned people like Will Campbell, a part-time farmer who works to improve relations between black and white. He is a graduate of the Yale University Divinity School and director of the liberal Committee of Southern Churchmen.

"We make short-term gains in race relations," Mr. Campbell said. "It's like a sieve: When there's pressure, the holes open and a few more gains get through. But we lose something in the process. We're still on opposite sides, still opponents, it seems. We lose a certain easiness with one another."

I spent an afternoon with Will Campbell in the log cabin that is his office. He busied himself fitting a storm window—a project that took three hours because he disdained a ruler, measuring everything by eye. Frequently he stepped over to a potbellied stove to spit tobacco juice into it. Finally he sat down in his antique rocker and in three sentences summed up, I felt, his thinking and writing of years:

"The Klan, the red-necks, the good old

Conveyor for the Bible Belt, Nashville's biggest business, religious publishing, is enjoying banner years. At Thomas Nelson, Inc., one of the world's largest Bible publishers, Debbie Cawthron (**left**) wraps volumes from the firm's 500 editions of six versions. Her pinup recalls that the legendary Elvis Presley, who got his start in Nashville and usually recorded there, often spread the gospel through song. So, too, do Roy Rogers and Dale Evans (**above, right**), in town to record a spiritual album. While a photographer's assistant adds light with a reflecting board, they pose for the album's cover.

boys, they're not really the problem. The problem is in our institutions themselves. Racism lives in the structure of institutions that perpetuate white dominance and favor whites in subtle ways."

City's Blacks Fight for Equality

I learned some details of the struggle for civil rights in Nashville from Dr. and Mrs. C. J. Walker, black Nashvillians at whose home the late Martin Luther King, Jr., stayed during the historic sit-ins and boycott of downtown merchants in 1960.

It's a pretty brick bungalow in north Nashville, and while I waited with Mrs. Walker for her husband to arrive, she told me how her community had been physically split by a new highway, Interstate 40. "It was supposed to go around," she said, "but they found that it was cheaper to put it through here."

Now a proposal to close inner-city schools is endangering Pearl High School, the main school in the downtown black community, she added. But protests have delayed the closing for a year.

"I used to teach there," she said. "During the sit-ins most of my students were downtown demonstrating. So I'd call the roll in the morning and in the evening, and in between I wouldn't ask where they went."

Dr. Walker, a physician, joined us. "It's different today," he said. "The establishment gives concessions one by one. First they opened some restaurants to blacks, then we backed off, and then we had to come

Hands lock in pride on graduation day at Fisk University—a respected school of higher education since 1867. At Meharry Medical College Dr. Edward E. Mays examines a blood specimen with his students (**right**). Alma mater to 43 percent of all black physicians and dentists now practicing in the U. S., Meharry has been a major source of medical manpower for the nation's inner cities.

Among Nashville's 17 colleges and universities, Vanderbilt University is called the "Harvard of the South," and George Peabody College is one of the nation's leading teacher-training schools.

on again to get them to open the rest."

He glanced at a framed photograph of his grandson in cap and gown. "Education is so important. And so is housing. The black newcomers are buying homes in the white areas, and this is good. Housing is the key. The revolution of the sixties broke many barriers, but we still haven't solved the problem of the ghettos."

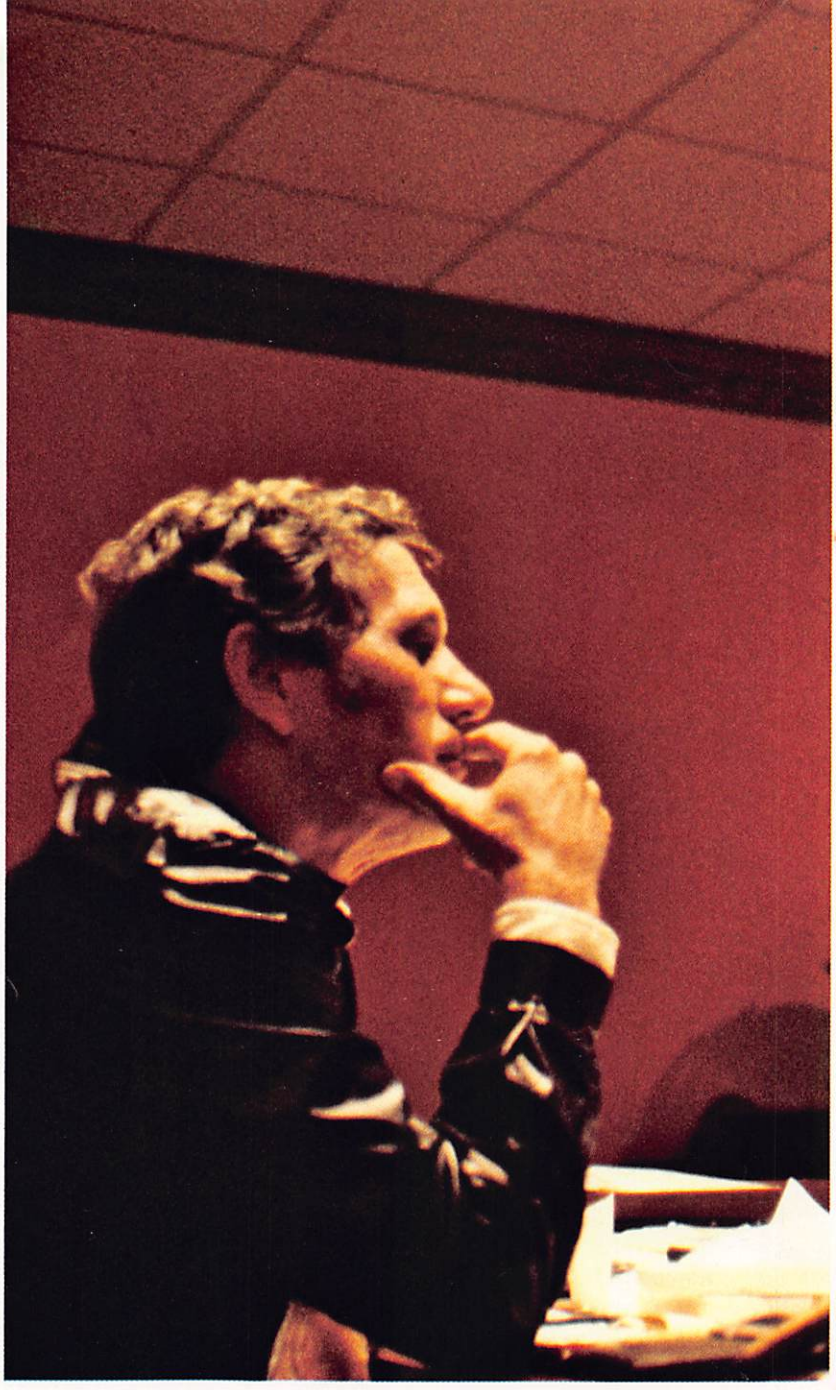
City's Future Scored *Allegro, Vivace*

What is it like to live in such a dynamic city? I found that Nashville's prime movers are enthusiastic about the future, sowing money back into the city. The Cheek family fortune, based on Maxwell House Coffee, has provided Nashvillians with the charming grounds, botanic gardens, and Fine Arts Center of Cheekwood Mansion. There the Swan Ball is held, high point of summer. The Children's Theatre, locally supported, has been invited to tour Europe this spring.

Nashville also is blessed with parks—from Centennial Park near midtown with its Parthenon, an exact copy commemorating the Tennessee Centennial in 1897, to Percy Warner Park in the west and Shelby Park in the east. Visitors also throng to the Hermitage, Andrew Jackson's home. Huge man-made lakes like Percy Priest and Old Hickory provide aquatic playgrounds.

In the end, it is Nashville's people who give it its quality. And, in the end, Nashville's fame still stems from its music.

One evening I strayed into Printer's Alley, once speakeasy row and still a nightlife center. At one club a slight young man named Kenny Sears was playing electric fiddle. He was a sideman, a free-lance musician who improvises song arrangements on the spot in recording studios. This is quite a feat—and a Nashville trademark—made possible by



Swapping licks with the master, New York jazz guitarist Lenny Breau tries something new on RCA's vice-president in charge of country music, Chet Atkins. Long hailed as one of the world's virtuoso players, Atkins is now the acknowledged "King of Music Row." Nashville's nexus for nearly a hundred record companies and studios, the area provides work and hope for a burgeoning pool of topflight union musicians, now some 2,600 strong. Like Atkins, many are at home in a broad range of musical styles, and represent a powerful lure for recording artists as diverse as Perry Como and Bob Dylan. Outgrowing its country trappings, the city's celebrated "sound" seems to have become the "Nashville bandwagon."

the musical framework of the song and the seat-of-the-pants skill of the sidemen.

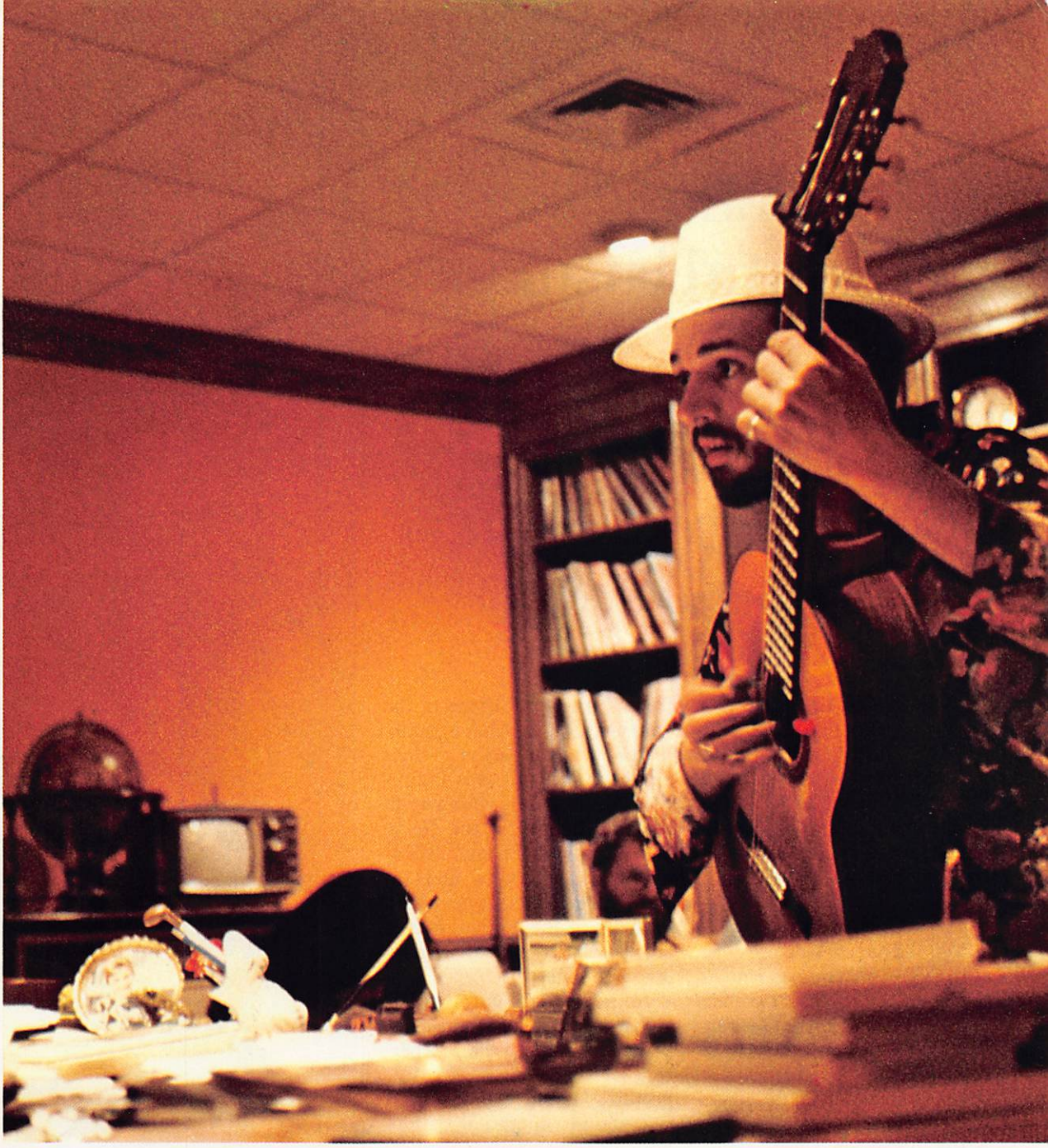
But Kenny was special: no collarbone fiddler but a superbly trained violinist. His mastery was obvious—control of dynamics and timbre, authority, and an easy precision. Sometimes, grinning, he slipped classical bits into his accompaniment while the star singer sailed on, oblivious. He was literally playing rings around the star.

Kenny told me that he started playing at 7 on his farm in Oklahoma, performed in local clubs at 8, and eventually received a full scholarship to a Texas university.

"I got a lot of miles on me," he said. "I'm 24. I used to work the dance halls. Had an uncle who was a hoedown fiddler, my inspiration."

"I suppose you write songs, like everyone else," I said.

"No," he said, smiling. "I don't want to be a star. I'm teaching classical violin as well as



music theory, and as a sideman I can make $121 per session, union rates. I can do as many as four sessions a day.

"New musicians are coming in from all over, well trained, sophisticated," Kenny continued. "Our group has a guitar player from Washington State, a drummer with a background in a classical orchestra, and a bass guitarist who was with a rock band. It's a breath of fresh air."

Does this mean that Nashville's music is being homogenized? You could say that. Or you could say it's a classic American melting pot, bringing new vitality to cud-chewing rhythms, bringing startling ideas, wild harmonies, and a poetry that sings of the real, the now, the alive.

Time was when they wouldn't even allow drums at the Opry, let alone brass. Now the doors are opening and the world is coming in, and there is a new excitement in Nashville, that many-faceted city. □

Holland's beautiful business

TULIPS

By ELIZABETH A. MOIZE
ASSISTANT EDITOR

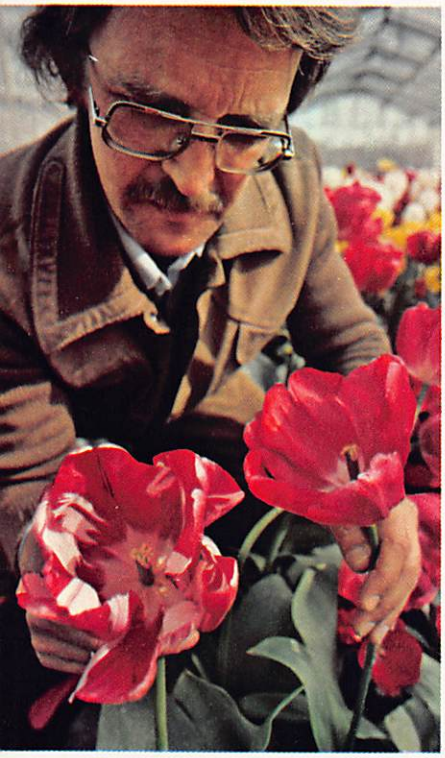
Photographs by FARRELL GREHAN

ASK A CHILD to draw a flower, and chances are it will be a tulip—a cup-shaped bloom atop a tall stem framed by several leaves. And when spring explodes in the Netherlands, thousands of acres of crayon drawings come spectacularly to life.

Yet strange blossoms in many different shapes caught my eye in the town of Limmen as I strolled the paths of a garden that is a living history of tulips. Here indeed were the familiar blooms, but others looked like crocuses with soft, pastel petals on short stems. Some had slender blooms with pointed lilylike petals, or plump, many-petaled flowers that resembled peonies. The list in my hand assured me that these were all tulips—flowers whose ancestors were brought from their original homes on the mountain flanks of central Asia—as well as hybrid varieties developed over the 400 years of Dutch bulb culture.

When the first tulips came from Turkey to Europe in the 16th century, the Dutch immediately took the flower to their hearts. And today growing tulip bulbs is a major industry in the tiny nation on the North Sea. Amazingly enough, in this age of agribusiness and increased mechanization, bulb growing in the Netherlands is still primarily a small family-operated enterprise.

In the bulb-growing districts along the coast north and south of Haarlem, more than 80 percent of the holdings are five hectares (12.4 acres) or less. A year-round operation, tulip-bulb growing occupies mothers and fathers, aunts and uncles, even the children. After helping in the fields, a Dutch boy carries some blooms to school on the back of his mother's bicycle (**right**). Everyone pitches in to plant in the fall, tend the spring flowers, and harvest the new bulbs in the summer. Last year Netherlands' growers produced some two billion tulip bulbs, shipping 142 million of them to the United States.



"IT WAS THE TIME when the Dutch . . . had begun to worship that flower, and to make more of a cult of it than ever naturalists dared to make of the human race for fear of arousing the jealousy of God," wrote Alexandre Dumas in *The Black Tulip,* a tale of romance and intrigue set in 17th-century Holland.

Near the end of the previous century, the first tulip seeds and bulbs had come from Turkey to Holland via Vienna. French botanist Carolus Clusius had procured the stock from the Austrian ambassador to the court of Suleiman the Magnificent. According to tradition, Clusius refused to part with any of his bulbs, except for scientific purposes. So, in the dark of night, envious Dutch gardeners stole them, and within a few years tulips were flourishing throughout their country.

Wealthy amateur growers eagerly paid high prices for unusual specimens, and from 1634 to 1637 speculation in tulips reached the ridiculous, bringing the country to the brink of financial ruin. To understand the tulipomania period in Dutch history, a lesson in tulip botany is necessary.

Tulips produced by seed will not usually flower for four to five years. But tulips that are reproduced by new bulbs will flower the following spring, bearing a bloom identical to the original. Occasionally, however—and this was the heart of the mania—"breaking" occurs.

The early European growers soon discovered that a bulb might suddenly and inexplicably produce a new bloom of different colors and bizarre pattern, and prices for these so-called broken offspring soared. One bulb of a tulip named Semper Augustus sold for the equivalent of $4,600. In a commodities market gone wild, speculators bought and sold bulbs that never left the ground. Businesses, homes, jewels, even a workman's tools were mortgaged or sold to buy bulbs in hopes of reaping a fortune. And some fortunes were made—until suddenly there were more sellers than buyers and the market crashed. The government stepped in to stop further speculation and restore order, leaving the tulip trade in the hands of serious growers and gardeners.

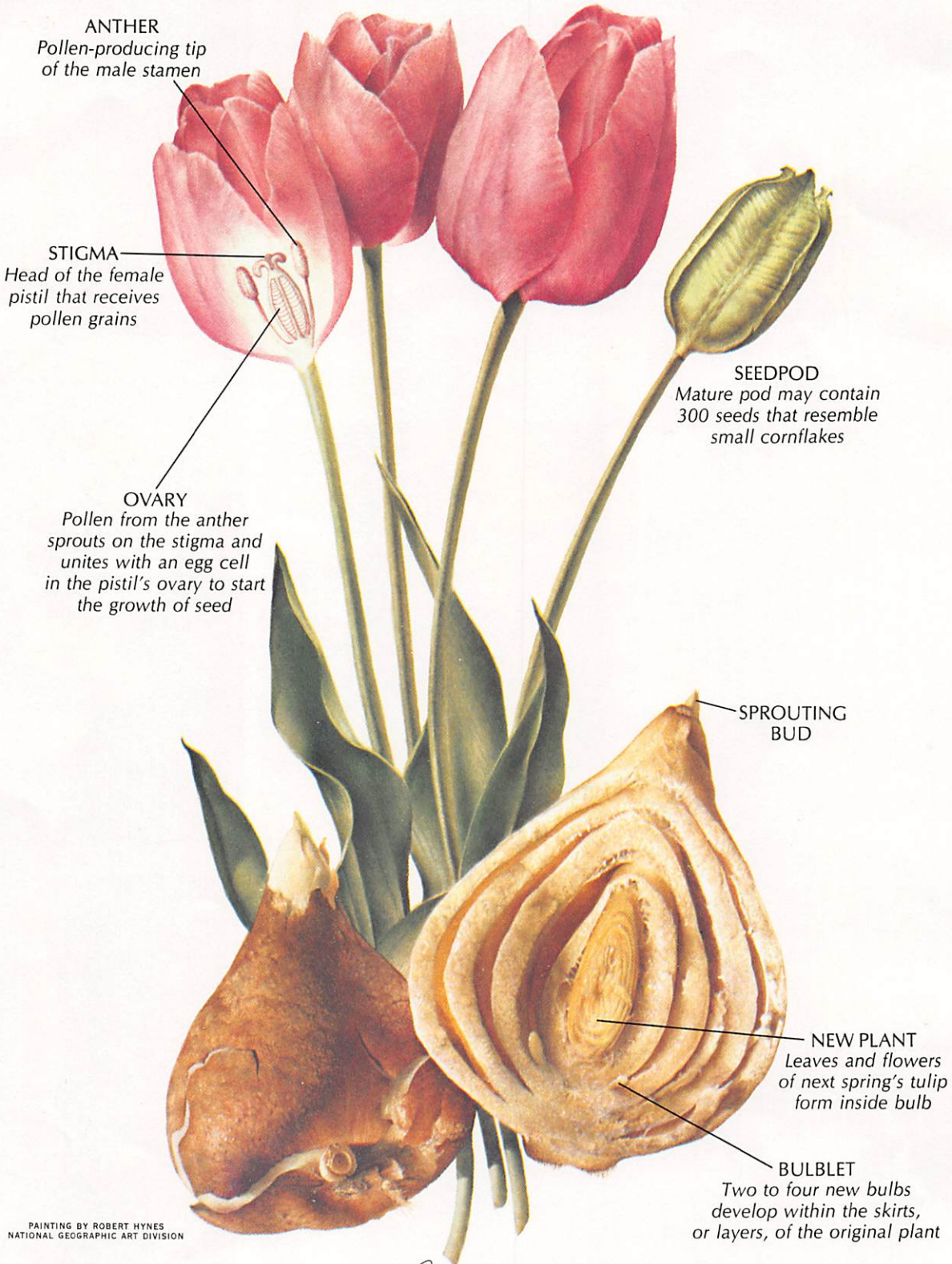
It was not until the early part of this century that scientists discovered that a virus causes a tulip to break. Sies Jan Toxopeus of the Institute for Horticultural Plant Breeding at Wageningen shows the spectacular change the virus causes (**left**). The plant in his left hand is a normal, healthy plant; the one in his right is an equally beautiful but diseased plant of the same parentage. The virus is carried by aphids and can spread quickly throughout a field if the sick plants are not removed and destroyed. After several years diseased tulips weaken and die.

Today's tulips descend from the less flamboyant but healthy plants that were preserved and propagated by gardeners unable to afford the spectaculars. One of the oldest tulips still produced in quantity, Keizerskroon (**lower left**) dates from 1750. The five hundred commercially grown cultivated varieties, or cultivars, now on the market are chiefly the result of hybridization in this century. The most recent new classification is the Darwin Hybrid, giant of the tulip world, with large blooms and stems that may reach 36 inches in height. A famous Dutch hybridizer, Dirk W. Lefeber, created the Darwin Hybrid class in the 1940's by crossing a Darwin—originally found in Flanders in the 1880's—with *Tulipa fosteriana,* a wild tulip from central Asia. All 364 seedlings from his cross sprouted, but Lefeber finally chose only ten to develop. Of those, multihued Gudoshnik (**right**), Apeldoorn, and Oxford became favorites.

"Off with their heads" would be an appropriate springtime slogan for Dutch bulb growers. While the home gardener is primarily interested in the flower, the grower's interest is in producing more and better bulbs. If the flower head is left untouched, much of the strength of the plant goes into making seed. Therefore, after carefully tending the new shoots, fertilizing them, and spraying for insects and fungi (**left**), people and machines tackle the blooms, cutting them off in their prime and forcing all the plant's energy into the bulb.

Future bulb growers who attend the Primary Horticultural School in Hillegom visit the fields with their teacher as part of their studies (**below left**). Here they learn how to identify and control diseased plants and how to recognize the proper time for beheading tulips.

A startling sight in the late spring is the mounds of blossoms piled as refuse. While some are given to farmers for barnyard ground cover—and, incidentally, food for cows (**below**)—most are left to decay or are hauled away (**right**).


ANTHER
Pollen-producing tip of the male stamen
STIGMA
Head of the female pistil that receives pollen grains
OVARY
Pollen from the anther sprouts on the stigma and unites with an egg cell in the pistil's ovary to start the growth of seed
SEEDPOD
Mature pod may contain 300 seeds that resemble small cornflakes
SPROUTING BUD
NEW PLANT
Leaves and flowers of next spring's tulip form inside bulb
BULBLET
Two to four new bulbs develop within the skirts, or layers, of the original plant

PAINTING BY ROBERT HYNES
NATIONAL GEOGRAPHIC ART DIVISION

The Tulip

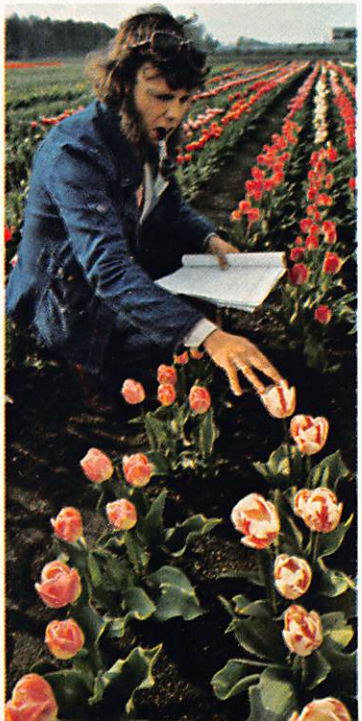
WHEN a new tulip is offered to the gardening public, few people realize that at least 20 years may have passed since it was hybridized. To create a new flower, first its parents must be chosen. Modern hybridizers seek plants that may produce bright, unusual colors or patterns, as well as carry characteristics of disease resistance, good bulb production, long-lasting blooms, and strong stems.

Once the parents are chosen, the hybridizer carefully cuts away from the intended mother flower the immature anthers (**painting, left**) to prevent self-pollination. When the stigma ripens, pollen from the selected father is brushed on meticulously (**top**).

In three or four months two to three hundred seeds can be harvested from a single pod. The following year the seedlings appear as small grasslike plants (**right**) that give little hint of future glory. The plant will grow larger each year until, usually in the fifth year, it produces its first flower. If the new variety shows promise, the hybridizer must now test it for several years before submitting it to the Royal General Bulbgrowers' Association for approval and inclusion in its international register of tulips. By now ten years may have passed, but the new tulip is still not ready for sale. Enough bulbs must first be produced to meet possible demand.

A mature tulip bulb contains the embryo of a plant—stem, leaves, and a flower complete with all its reproductive parts. After the plant flowers, the original bulb begins to disintegrate, leaving two to four new bulbs that have developed within the skirts or layers of the original. Thus tulips multiply. And only thus can enough stock be accumulated to offer the new cultivar to the public.

Since 1967 a hybridizer has been able to register for plant breeder's rights, similar to a patent. Now when he sells to another grower, the latter must pay a royalty on bulbs he raises and sells. Of course, if while he is growing such flowers, a plant with different characteristics should appear, the new flower, known as a mutant, or sport, belongs to the grower in whose field it appears. In an attempt to discover some of a bulb's possible mutations, hybridizers may send bulbs from their new cultivars to the Institute for Atomic Sciences in Agriculture at Wageningen. There scientists expose the bulbs to X rays. The results can be seen the following spring (**right**), when a technician checks two mutants of the cultivar growing in the row to his left.

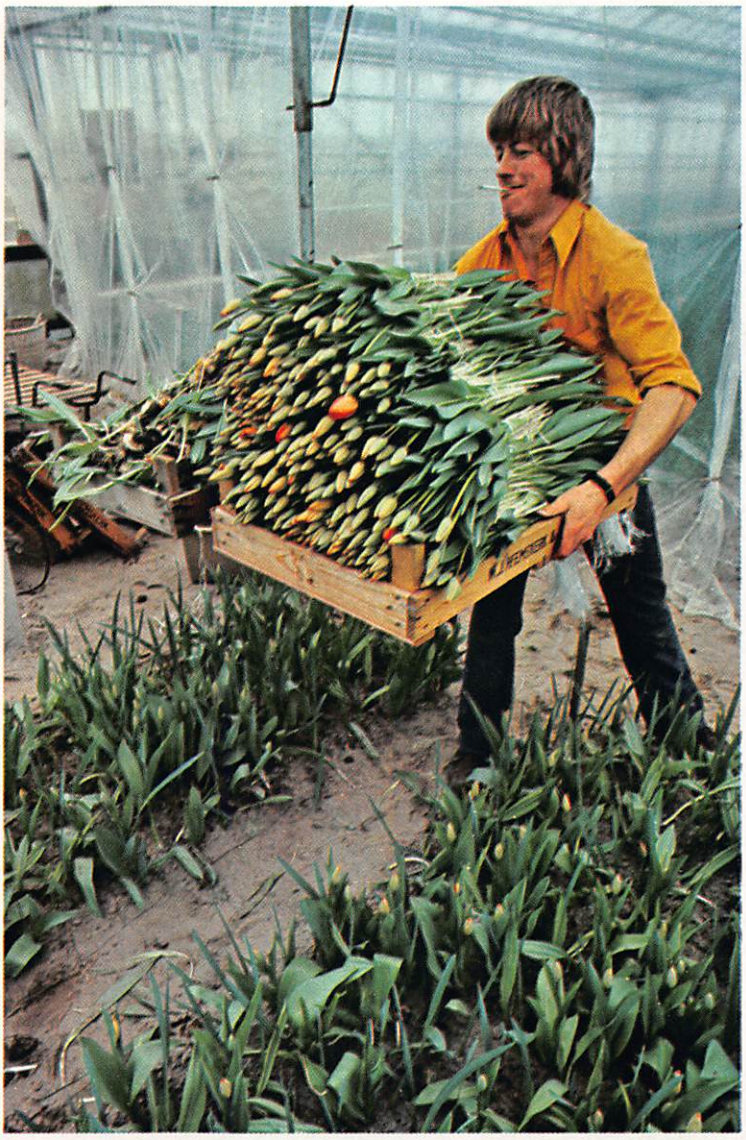


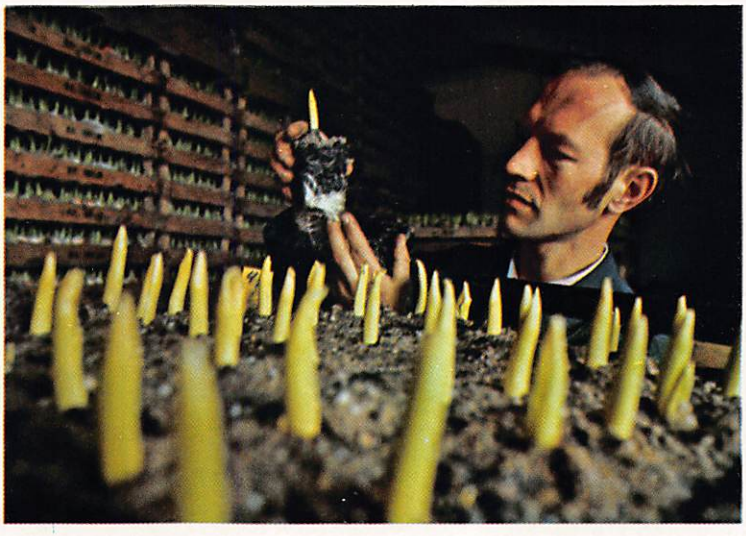
Bright ribbons of tulips, along with swaths of hyacinths and daffodils, decorate the fields of Holland in spring (**overleaf**).

BY MIMICKING NATURE, flower forcers are able to make tulips bloom as early as Christmas. First the bulbs are harvested and stored dry in trays at temperatures that simulate late summer. After the embryonic flower within the bulb has developed to the proper stage, the temperature is lowered to begin providing the cold all tulips need to flower properly.

In his chilled rooting room, J. P. van den Hoek (**below right**), an expert who forces tulips for flower shows, checks root development. After 15 to 20 weeks of "winter," the plants can be sold as potted plants or transferred to a greenhouse where they rapidly grow to the bud stage. Cutting is the final step (**right**).

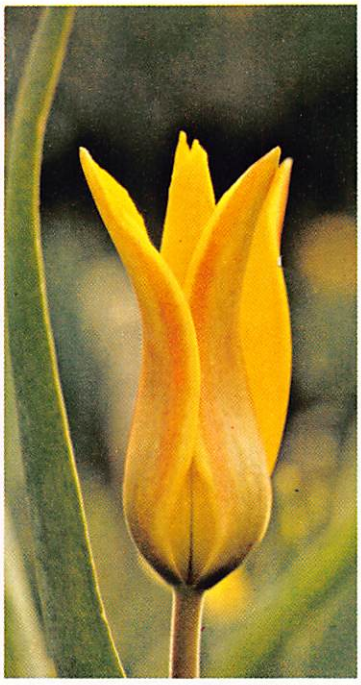
The largest auction house in the world, at Aalsmeer, processes potted bulbs and cut flowers in a building that covers an area equal to 30 football fields. Every single bloom sold passes through one of the five auction rooms where exporters, wholesalers, and shopkeepers bid on the flowers of their choice. As a cartful of tulips enters one of the rooms (**left**), buyers watch the clock on the right. Lighted numbers indicate that nine containers, each with 300 flowers, are now being offered. As the dial moves counterclockwise from 100 to 0 (gradations in Dutch cents), a buyer presses a desk button at the price he wishes to pay. Through combination microphone-speakers, buyers can both hear an auctioneer describe the flowers and respond with the quantity they want to purchase. The computerized facility handles 200 to 300 carts per hour in each auction room. Flowers cut the previous afternoon are sold here in the morning and are shipped to their destination within hours.





TULIPA AUCHERIANA

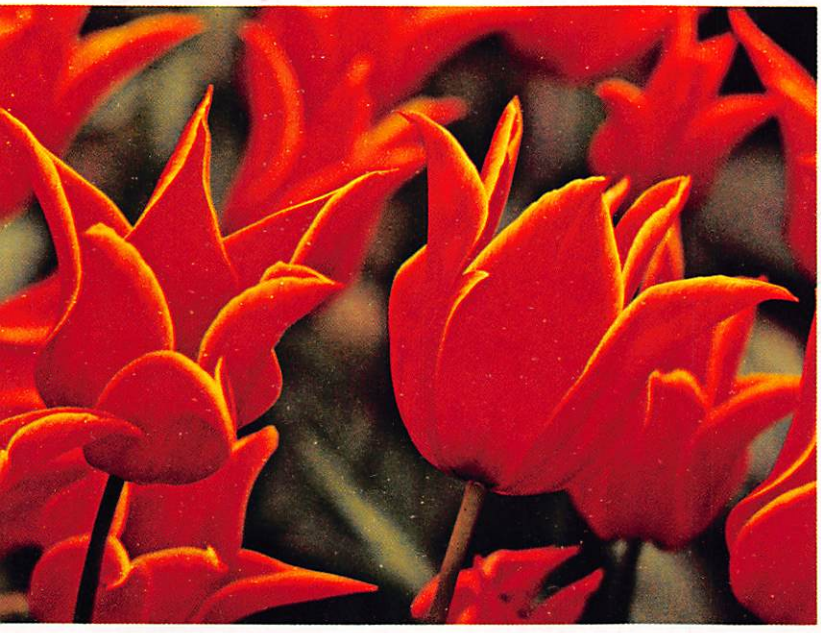
TULIPA MAXIMOWICZII



TULIPA FERGANICA

"I THINK IT IS POSSIBLE that new species or varieties may still be found in the vast Asian mountain ranges of the Tien Shan and the Pamirs," a horticulturist told me. There are 125 known wild, or species, tulips. How exciting to think more might be found! Of the three tulips shown above, *T. maximowiczii* and *T. ferganica* came from the Pamirs, *T. aucheriana* from the region around Tehran, Iran. Experts believe that the tulip spread from the heart of central Asia to Afghanistan, Iran, and the Caucasus near Turkey. The species tulips along with the other varieties shown on these two pages are grown primarily for hybridizing purposes, and are not widely available commercially.

While the familiar tulip shapes, such as Aureola, remain the most popular, other shapes and forms add variety to the garden. Windmill and Queen of Sheba show the lily-flowering shape in its prime; Tiko's petals have fully opened



QUEEN OF SHEBA

TIKO

WINDMILL

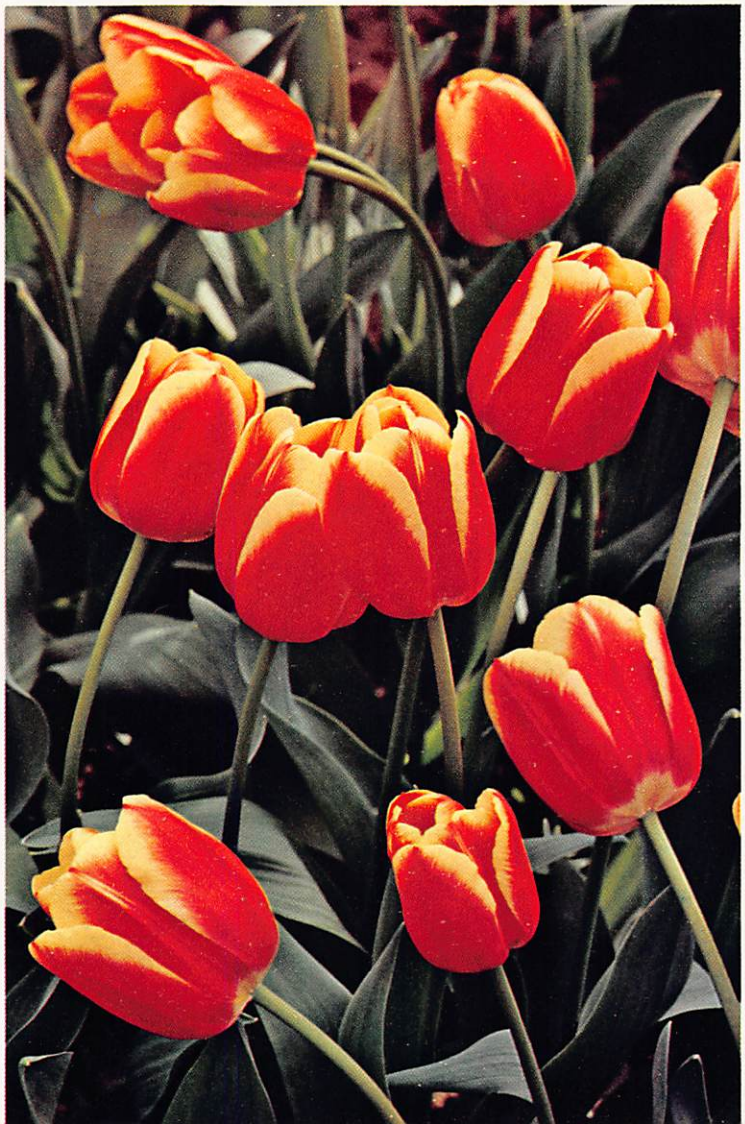
DOUBLE FANTASY

BATTERSEA

in the last stages of bloom.

Double Fantasy and other parrot tulips are all descended from mutations, although recent attempts at hybridizing have been successful. Both parrot and peony-flowered types, like May Wonder, bloom late in the season. Battersea, a Darwin tulip, wears a delicate fringe.

MAY WONDER; AUREOLA (RIGHT)



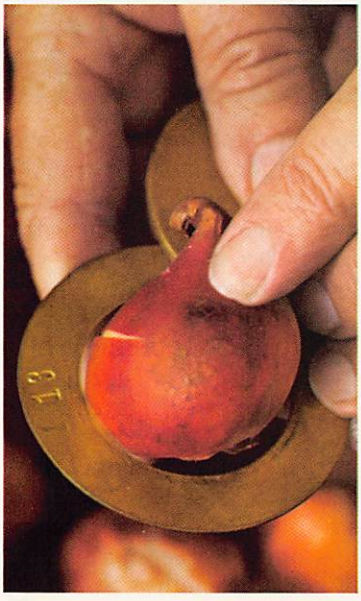
THE HARVEST IS IN, and baskets and boxes of bulbs pile up in an exporter's warehouse. Weeks before, young people from throughout Europe had flocked to the fields to help dig the bulbs (**below**). Thereafter they were carefully cleaned, sorted according to size, and delivered to the exporter. Many exporters contract months in advance with growers to supply them with a certain quality and quantity of bulbs.

A special court settles disputes in the industry. If, for example, an exporter thinks he has not received the size bulbs he ordered, he takes his case to the judges—two lawyers, three exporters, and three growers—who size a sampling of bulbs (**bottom left**) and announce their decision.

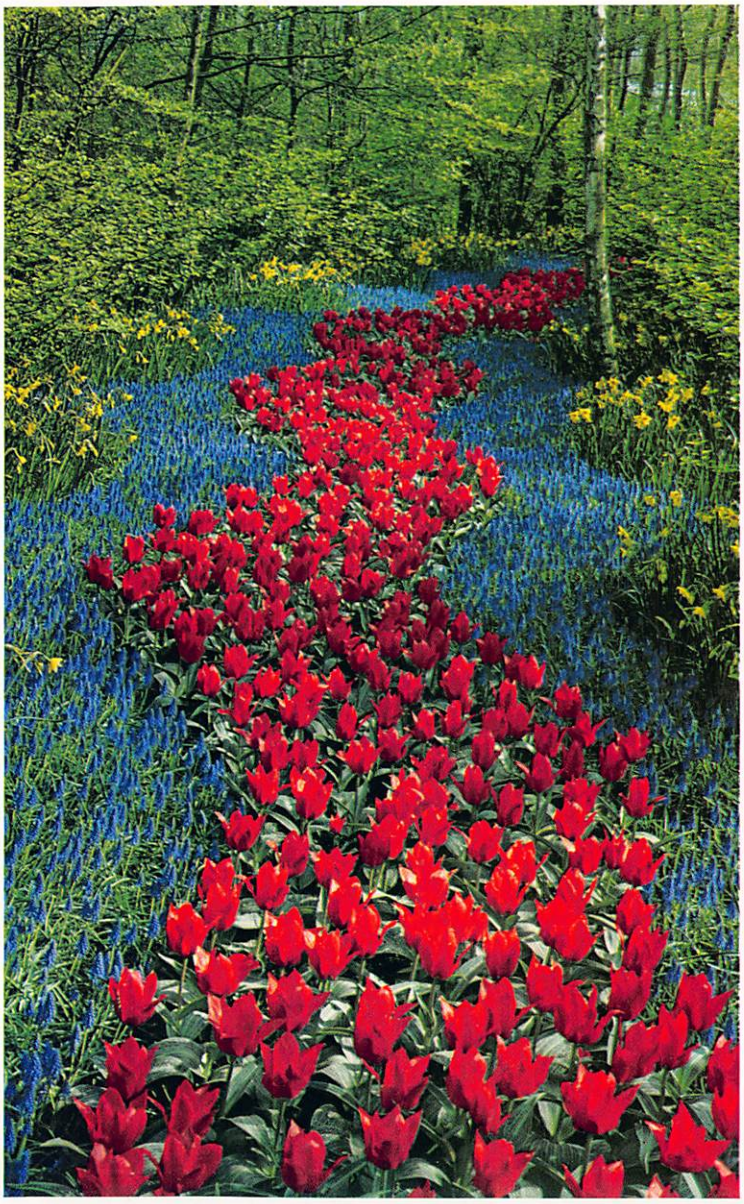
Bulbs destined for the United States must pass stringent requirements to guard against the introduction of plant pests and diseases. Since 1951 the U. S. Department of Agriculture, with the cooperation of Dutch exporters and the Netherlands Plant Protection Service, has inspected tulip bulbs before shipment, the only permanent operation of its kind outside the United States. Nunzio Santacroce (**facing page,** in dark suit), USDA representative, checks bulbs for signs of harmful fungi, insects, and other organisms.

Prior to the U. S.-Dutch agreement, bulbs were held at a U. S. port until each container was opened and inspected. If organisms were found, the shipment was refused—at considerable cost to both importer and exporter. Now bulbs are inspected, packaged, and often stamped with U. S. prices before shipment.

Both bulbs and flowers exude small amounts of ethylene gas. If shipment containers are not properly cooled and ventilated, the gas can abort the embryonic flower within the bulb. Scientists at the Bulb Research Laboratory in Lisse believe that there is a correlation between the amount of ethylene given off by the flower and the life of the blossom. A technician measures the gas (**below**) in the continuing research to prolong the blooming period.



How to grow tulips



TO MANY PEOPLE, tulips are showy blossoms that last all too briefly in the spring. By planting different types, a gardener can enjoy a variety of shapes and colors that will last from the first warm days until June. The species tulips are usually the first to bloom, followed by those categorized as early flowering, midseason, and late flowering. The color, height, and time of bloom should be considered when planning a garden.

In the fall, tulips can be planted by preparing the entire bed at once or by digging holes for each bulb. In either case, the soil should drain well. If you plant in a soil high in clay content, add sand, peat, or vermiculite to a depth of 12 to 18 inches. If the soil is too sandy, work in rich peat or compost.

Although bulbs contain their first season's food supply, fertilizer should be added at planting to foster future growth. Bone meal or another fertilizer high in phosphorus and calcium should be worked into the soil at the bottom of the bed to provide essential elements in the region of the roots.

Set the bulbs so that the pointed end of each is at least eight inches below the surface. Some gardeners find that planting them even deeper—as much as a foot—allows the bulbs to remain in the ground for as long as five years before they must be dug up for thinning and replanting. After positioning the bulbs firmly but gently, half fill the bed with soil, and water thoroughly; then completely cover the bed and water again.

A three-inch mulch of leaves, peat moss, or evergreen boughs will protect the bulbs in severe cold, but the mulch should be removed in the spring when the shoots first appear. Then add a fertilizer with a high nitrogen and potassium content.

Cut off the flower heads when the petals begin to droop; otherwise the plant will go to seed and rob the bulb of food needed for next year's growth. Allow foliage to die naturally and remove only when the leaves become limp and yellowed and pull free easily.

By following these procedures, gardeners can create floral masterpieces. Dutch bulb growers have displayed their skill and artistry for more than 25 years on the grounds of Keukenhof, outside Lisse, where a stream of Red Riding Hood tulips (**above**) sweeps past banks of grape hyacinths. □

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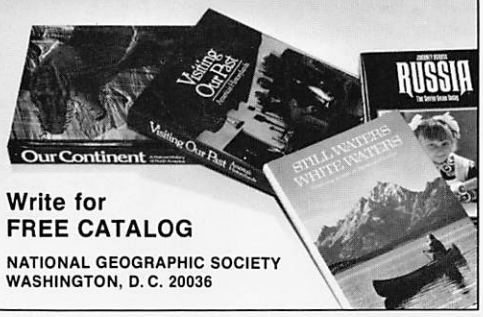

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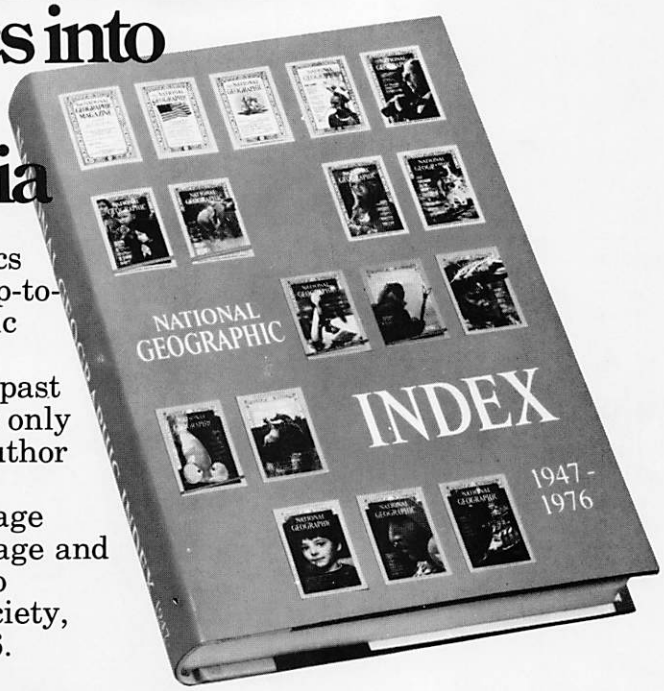

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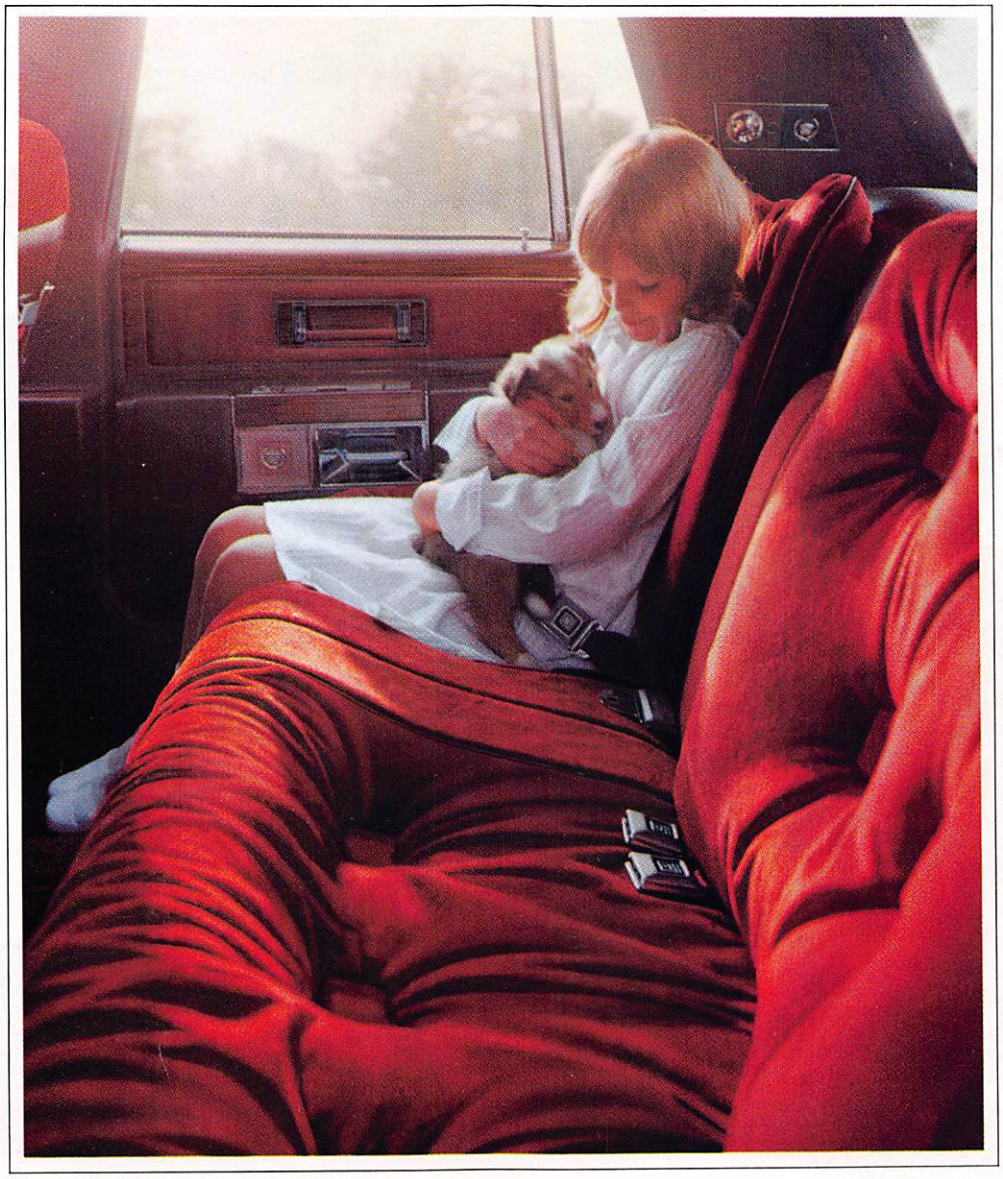

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